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Electric Railway Journal

Volume 64

July to December 1924

McGraw-Hill Company, Inc.
Tenth Avenue at Thirty-sixth Street
New York City

How to Use the Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, city, state or nation. Entries about electric railway companies are under the name of the city in which the main office of the company is located, but in the case of electrified sections of steam railroads, the entries appear under the name of the railroad.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the common keywords used in the index to this volume. This list has been subdivided for convenience into fourteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index unless, like "employees," they appear also in small type. As an example of how to use the index, if a reader wishes to locate an article on special trackwork he would obviously look in the list under the general subject Track and under this caption, only Special trackwork could apply to the article in question. The reader would therefore refer to this keyword under S in the body of the index.

The list of keywords is revised from time to time to keep the index abreast with developments. In this index, articles relating to motor buses have been grouped under six heads, as shown below.

In addition to the groups of articles covered by these headings the papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed. Short descriptions of machine tools appear only under the heading "Repair shop practice; shop methods and equipment" and are not indexed alphabetically, because of the fact that there is a wide choice in most cases of the proper keyword to be used.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION

Accident claim department
Accidents (including wrecks)
Medical
Safety work
Storm and fire damage

ELECTRIC CARS AND SERVICE CARS

Cars (including car design)
Locomotives
Service and tower trucks
Trackless trolley

CAR EQUIPMENT

Bearings
Brakes and compressors
Current collection
Doors, car
Electrical equipment for cars (except motors)
Gears and pinions
Heaters, electric
Lighting and lighting fixtures
Motors, Electric
Resistors
Seats
Trolley wheels
Trucks
Wheels and axles

EMPLOYEES

Education
Employees
Labor
Medical
Strikes and arbitrations
Tests, Psychological
Wage decreases
Wage increases
Wages and working agreements

FARES

Fare collection (including apparatus)
Fare decreases
Fare increases
Fares
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Traffic stimulation

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Appraisal of railway property
Blanks and forms
Discontinuance of lines
Financial (methods of financing)
Franchises
Insurance, Fire
Insurance and pensions
Legal
Legislation for railways
Market conditions
Operating records and costs
Public service and regulative commissions
Statistics
Taxes

HEAVY ELECTRIC TRACTION

Heavy electric traction (general)
Locomotives

MAINTENANCE OF EQUIPMENT

Car cleaning
Lubrication
Maintenance practice
Motor buses, Practice with
Painting
Repair shop practice; cars and car equipment
Repair shop practice; shop methods and equipment
Repair shops and equipment
Stores
Tests of materials and equipment
Welding

MOTOR BUSES

Motor buses, design
Motor buses, field for
Motor buses, installations
Motor buses, jitney competition
Motor buses, practice with
Motor buses, regulation

POWER

Energy checking devices
Energy consumption
Fuels
Overhead contact system
Power distribution

POWER—Continued

Power generation
Power stations and equipment
Power transmission
Substations and equipment

STRUCTURES

Carhouses and storage yards
Power stations and equipment
Repair shops and equipment
Substations and equipment
Terminals and waiting stations

TRACK

Pavements
Poles
Rail joints and bonds
Rails
Special trackwork
Ties
Track construction
Track maintenance

TRAFFIC AND TRANSPORTATION

Advertising
Customer ownership
Freight and express
Interurban railways
Merchandising transportation
Publicity
Public, Relations with
Rapid transit (elevated and subway)
Schedules and timetables
Signals
Street traffic congestion
Traffic investigations
Traffic regulation
Traffic stimulation
Transportation, Metropolitan (general studies)

MISCELLANEOUS

European practice
Historical
Government ownership
Management
Noise reduction
Railways (general)
Snow and ice removal
Standardization
Wood preservation

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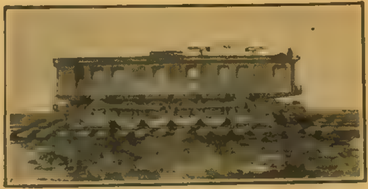
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Where the Industry Looks for Information

HE IS a wise man who learns from the experience of others, says the ancient proverb. This kind of wisdom, however, has for a long time been characteristic of the electric railway industry. Its executives and engineers are always eager to know what the other fellow is doing and to follow his lead when he has developed a successful idea.

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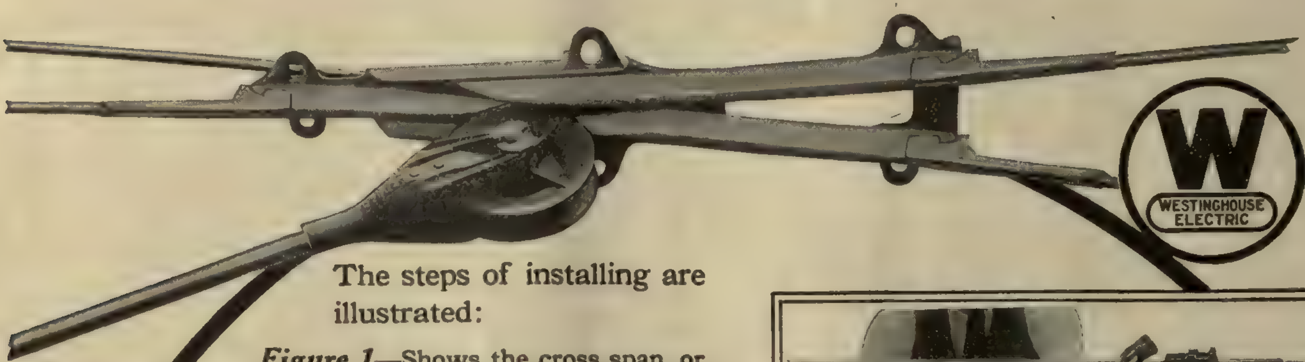

The steps of installing are illustrated:

Figure 1—Shows the cross span, or come-along, placed over the trolley wires, leaving the space below the wires free.

Figure 2—Shows the frog body in mesh with two approaches. The long, powerful motion offered by the frog body makes this operation easy.

Figure 3—Shows the two wires drawn over the clamp and held in place. A line tool, Style 128426, is used to draw the third approach in line with the inclined lock race. The approach is driven home by a series of blows on the driving anvil cast on the approach.

Figure 4—Shows the frog hung in position for the curve test. If found to be in proper location with respect to the track, the approaches are clinched, as illustrated in ***Figure 5.***

The diagram, ***Figure 6,*** indicates clearly the position of the runners. The angle is 8° where the runners overlap and 12° at the end of the frog.

Leaflet 20151 gives full particulars.

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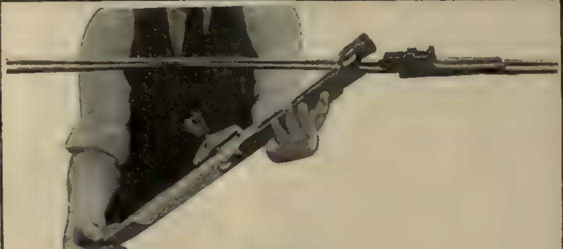

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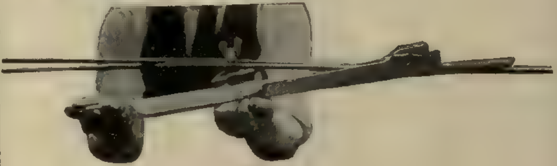

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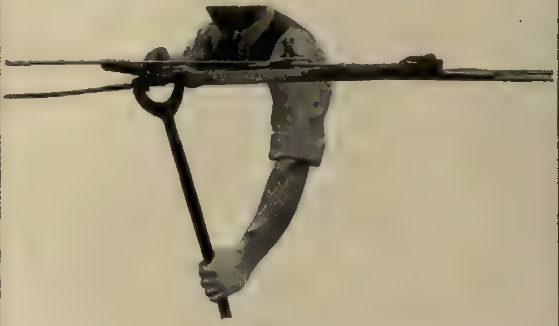

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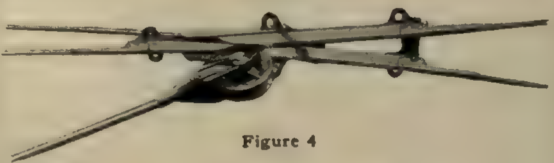

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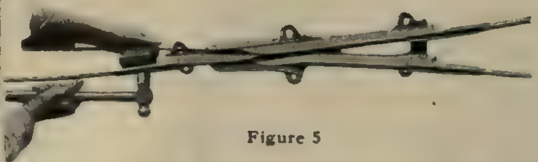

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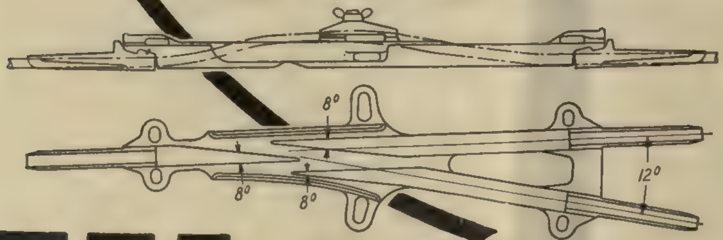

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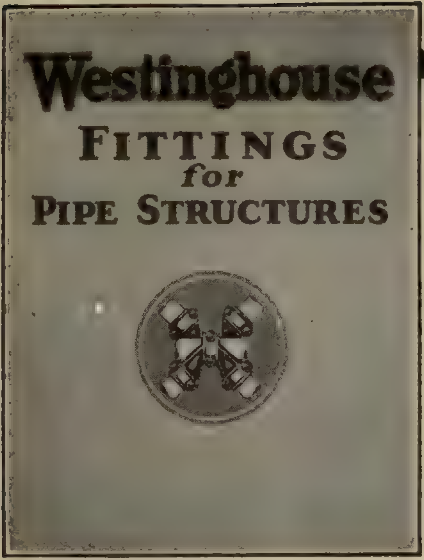

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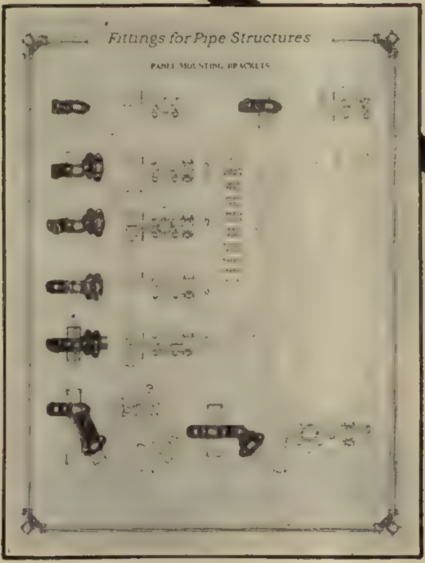

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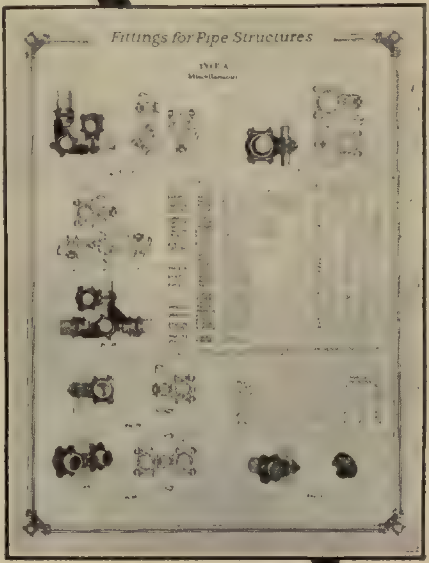

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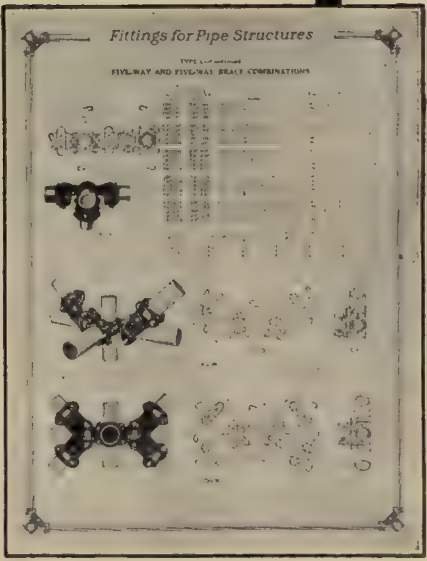

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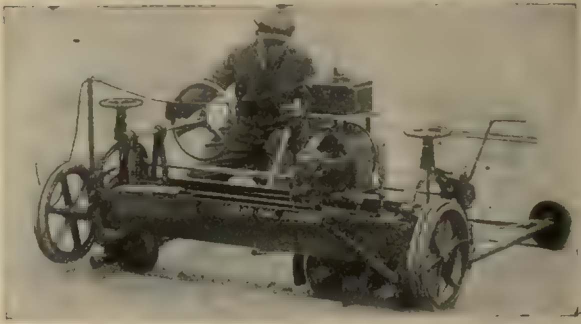
"Universal" Rotary Track Grinder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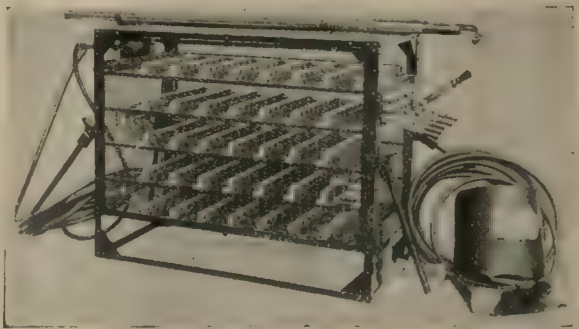
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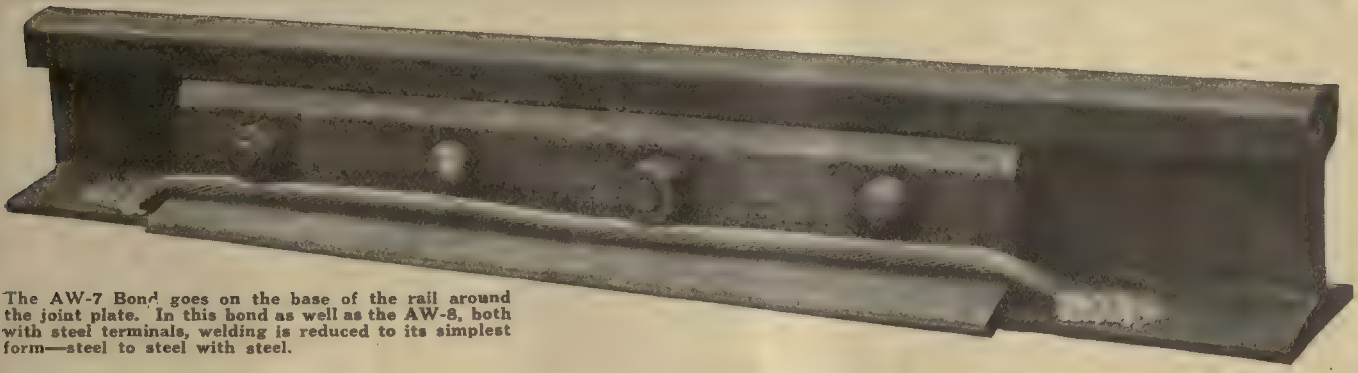

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Publication 502 has some interesting facts on bonding. Write for a copy.

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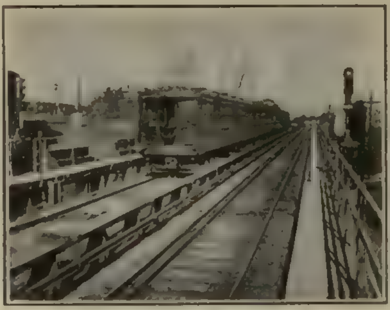
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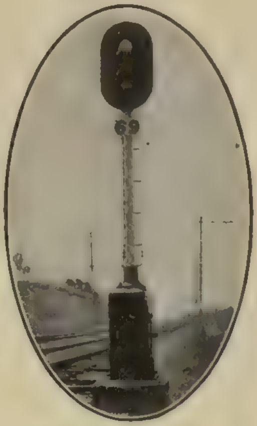
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Public Confidence

IS ASSURED to Railways equipped with Union Automatic Block Signaling Systems. Return on the investment is secured by the direct and indirect savings produced.

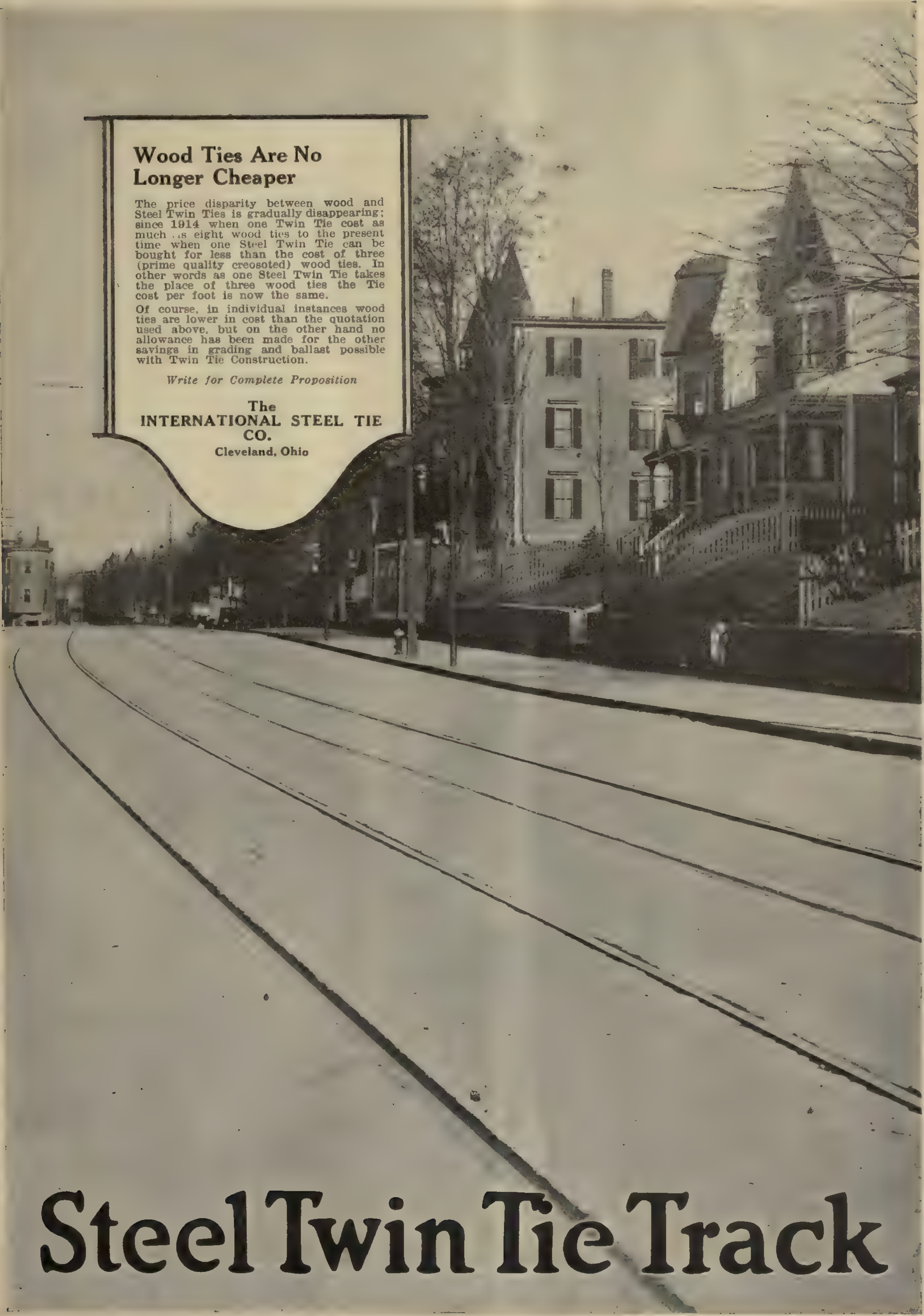
To be Complete—Safe, a signaling system must be based upon the sound principles of the Continuous Track Circuit, or in other words, a means must be provided whereby each car or train is responsible by its mere presence *anywhere* in the block or spacing section to *continuously* maintain one or more opposing stop signals in front of it as well as a stop signal behind it.

Local conditions govern each installation. Let one of our Engineers show you the benefits which Signals will produce for your Railway.

Union Switch & Signal Co.

SWISSVALE, PA.

TRADE
US
MARK



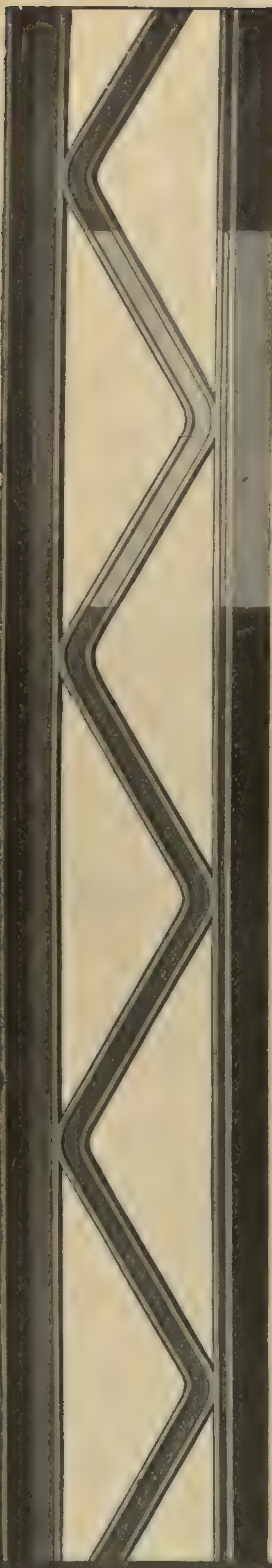
Wood Ties Are No Longer Cheaper

The price disparity between wood and Steel Twin Ties is gradually disappearing; since 1914 when one Twin Tie cost as much as eight wood ties to the present time when one Steel Twin Tie can be bought for less than the cost of three (prime quality creosoted) wood ties. In other words as one Steel Twin Tie takes the place of three wood ties the Tie cost per foot is now the same.

Of course, in individual instances wood ties are lower in cost than the quotation used above, but on the other hand no allowance has been made for the other savings in grading and ballast possible with Twin Tie Construction.

Write for Complete Proposition

**The
INTERNATIONAL STEEL TIE CO.**
Cleveland, Ohio



Bates Poles on Electric Railway in Coruna, Spain

Bates Poles with specially designed trolley supports are used along the right of way of the Compania de Travias de la Coruna at Coruna, Spain.

A perfect truss made from one piece of steel, without rivets, bolts or wheels, Bates Poles have remarkable strength and give sturdy service. Mass production makes them economical in first cost, their simplicity makes them easy of maintenance.

Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

Simply hold them against the revolving commutator, moving them slowly from side to side.

AETNA

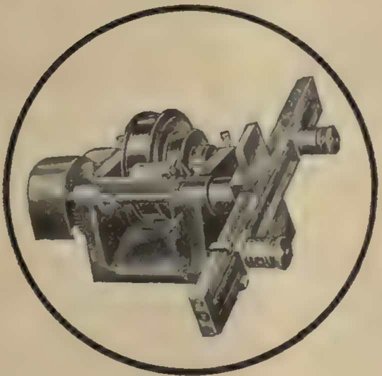
COMMUTATOR SMOOTHING STONES

"Outwears any other smoothing stone"

Your motors and generators will operate much more efficiently if you smooth the commutators occasionally with Aetna Smoothing Stones.

They quickly remove all scores in the commutator and undercut the mica at the same time. They remove the undesirable glaze on the commutator and thus restore the original highly efficient surface.

Try them and be convinced. Write a postal card for Bulletin No. 199.



Segur Coil Winding Tools

For reducing motor maintenance costs. The complete line includes—hair pin loop winders, coil taping machines—coil spreader, magnet wire reel, racks and tension devices—commutator screw presses—copper bar benders.

Manufacturers of a broad line of electrical material for industrial plants. Particularly electric railway haulage supplies.

ELECTRIC SERVICE SUPPLIES CO.

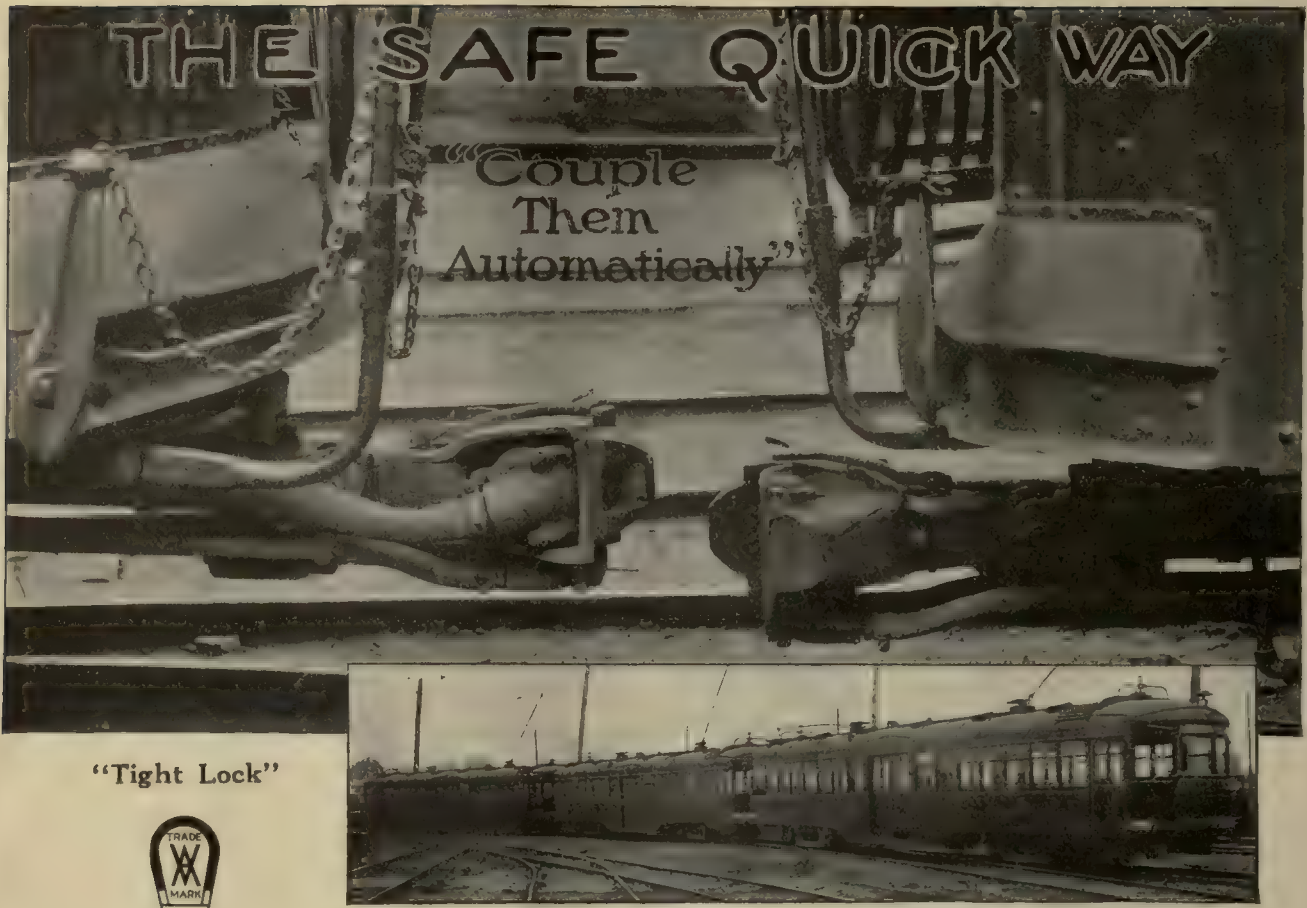
ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
629 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver



"Tight Lock"

Westinghouse Automatic Couplers in Train Service

Electric train service reaches the highest degree of economy and efficiency when Westinghouse Automatic "Tight-Lock" Car, Air and Electric Couplers are used.

Time is saved in coupling cars together during train makeup, and the elimination of any manual operation assures maximum safety for employees called upon to do such work.

Write for further information

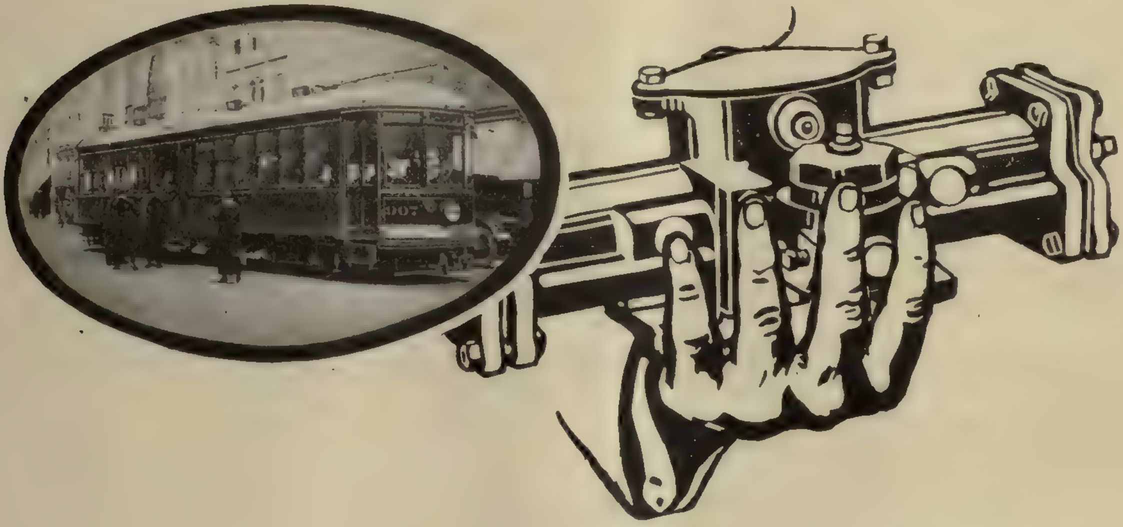
Westinghouse Traction Brake Company
General Offices and Works: Wilmerding, Pa.

3 Sizes

Westinghouse Automatic Couplers are furnished in three separate sizes to meet the requirements of all classes of service—the "H" type for heavy, high-speed cars, the "K-1-A" for light and medium-weight cars and the "C-3-A" for light cars in cases where the electric feature is not required.

WESTINGHOUSE TRACTION BRAKES

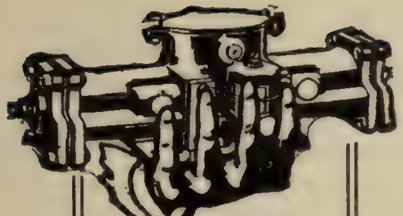
Quick "Get-away!"



NATIONAL PNEUMATIC
Door Engines and Control

are as much a necessity on the modern street car as a self-starter is on the present-day automobile. The hand-operated street-car door is as obsolete as the hand-cranked motor car.

The saving of time, and the greater safety, more than pay for the installation of National Pneumatic Equipment.



Door Engines

Door and Step Control

Operating Mechanisms

Motorman's Signal Lights

National Pneumatic Co., Inc.

Originators and Manufacturers

***Principal Office:* 50 Church Street, New York**

Philadelphia—Colonial Trust Building Chicago—McCormick Building

Works—Rahway, New Jersey

Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.

Stacks of Grade 2 and Grade 3 ties seasoning at the Beaumont plant.

Note how carefully the ties are stacked high from the ground on creosoted supports.

Quality Leadership

International is proud of its position as the leader in the tie industry. It has achieved this leadership by conducting a great tie business on a quality basis, by producing ties in accordance with the Standard A. R. E. A. Specifications and by standing squarely behind its ties during their entire life.

International inserts its dating nail in every tie which leaves its plants to guarantee that it represents *International* Tie Quality, which means sound, high grade ties of full size, carefully graded, plainly marked, thoroughly seasoned, and effectively treated.

To entrust *International* with your tie contract is to guarantee yourself the great value and economy of REAL TIE SERVICE.

International Creosoting & Construction Co.
General Office: Galveston, Texas
Plants: Texarkana, Texas
Beaumont, Texas Galveston, Texas

This International dating nail is the 18 Karat mark on ties. It's our assurance and your protection.

International
Standard Specification Ties

The *entire* job from our shops

Responsibility for the efficiency of Fifth Avenue Bus equipment is not divided. Our buses are delivered ready to run. You do not buy a chassis in one place and a body somewhere else and call the assembled result a Fifth Avenue Bus.

When electric railway men buy Fifth Avenue Bus equipment they are dealing with only one big, long established and unquestionably reliable firm. Our name, reputation and goodwill are built into our products. With our buses goes our attention and service to the end that satisfactory results from every angle may be secured.

Every unit that goes into a Fifth Avenue Bus chassis is put through every known test. Our system of inspection is complete in every detail. Fifth Avenue Bus bodies are built in our own shops from the sills up. Every bolt and screw is affixed under Fifth Avenue supervision. Lastly, our road test is supervised by men who have been identified with motorbus development for more than a decade.

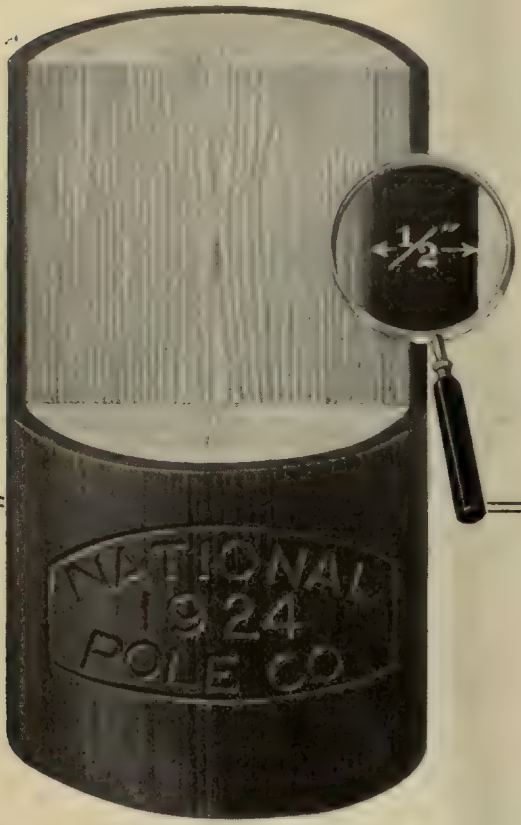
NEW YORK TRANSPORTATION CO.
New York, N.Y.

Western Red Cedar

Light, Durable and Strong
Plain or Treated Poles

Northern White Cedar

This cross-sectional view of a Pentrex-Treated stump clearly illustrates the uniform impregnation that occurs as a result of the puncture process. Each pole so treated is guaranteed to have an oil penetration of ½ to ¾ in., according to which one of the two Pentrex specifications is selected.



A 90-foot pole in our treating plant at Everett, Wash. The butt of this pole is 23 inches diameter. Note the foot rule for comparison.

Facilities to handle any special requirements

Butt treatment of 75 to 90-foot poles is not a usual requirement, but National Pole Company facilities take this job just as readily as any standard one.

Standard half-inch penetration is guaranteed and our exceptional facilities and unusual care in control of methods and materials insure selection, seasoning, treatment all of the same high quality.

National Pole facilities make possible a pole delivery service that is unapproachable in the entire cedar pole industry.

NATIONAL POLE COMPANY

Escanaba, Michigan

Distributors:
Western Electric Company

Blame it on friction

Yes—nearly all this immense amount of repair work, overhaul and replacement can be traced back directly or indirectly to friction. Only a few real smashes occur through out-right accidents.

Can friction be overcome? Never entirely, —but it can be minimized greatly by adequate lubrication with suitable products.

Galena lubricants, for electric car trucks and equipment are made specially for this service. Their co-efficient of friction is lower than any other lubricants manufactured. Galena Service goes with them to insure their use in the proper way with utmost economy.

The result of Galena Service shows in the reduction of maintenance work, power saving and longer life of bearings.

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities

An unusual application of G-E Telephone Protective Equipment by the Indiana Columbus & Eastern Traction Co. The telephone apparatus on each car is protected.

"Service interrupted—and no telephone." Are your lines protected?

Safeguard your telephoning

Telephone lines used in power distribution, especially those closely paralleling high-tension lines, need protection. Induction from the power circuit, crosses with the power circuit, and lightning disturbances are too likely to interrupt communication between stations when it is most needed.

G-E Telephone Protective Equipment protects against all these sources of trouble. Properly applied, it also safeguards line-men and station operators from injury.

Ask the nearest G-E Office for Publication Y-1357, which describes the equipment you need, if you want proper protection.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

338-43

New York, July 5, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 64
Number 1

A Day for Inspection of Exhibits

AT THIS year's convention of the American Electric Railway Association Wednesday is to be set apart on the program exclusively for the inspection and study of exhibits. The American and all affiliated associations are to have no business sessions on this day. The way will be cleared so that no one will have reason to say this year, as many always have had occasion to, that they had had scarcely any time to see the exhibits.

This new plan is frankly an experiment. It ought to be a great success. The exhibits are well worthy of this special recognition. The plan has the enthusiastic indorsement of the manufacturers. It increases the value they may expect to derive from the large sums of money invested in their exhibits. And because of the expense and effort they are put to, they are entitled to this more definite share in the allotment of convention time.

But the plan will fall down miserably if Wednesday is taken by many as a day off to play golf instead of a day off to study the exhibits. Railway executives should make it plain to the men they send that their duty is to be on the pier among the exhibits on Wednesday. And the executives should take some of this to heart themselves. Then as a further inducement, the exhibitors would do well to arrange special attractions at their booths on Wednesday. The Convention Daily of ELECTRIC RAILWAY JOURNAL will do all it possibly can to co-operate in telling the delegates of all the attractions that will invite their presence on the pier on this day off from business sessions.

Is the Service Ready for the Spotlight?

IN A RECENT paper on selling transportation the statement was made that the railways should not turn on the spotlight of publicity until they are ready for it. The thought might be expressed another way by saying we must be sure that we have for sale that which we advertise. Advertising alone will not sell goods. Advertising only creates a demand. Unless that demand is met by good merchandise when the customer calls for it, the advertising is likely to be just an expense rather than a real help.

Nothing hurts the reputation of a merchant more than to make claims for his merchandise that are not fully met when his customers buy the product advertised. Our customers are the car riders. Our salesmen are the platform men, and our product is transportation. We are the merchants, or rather, both the manufacturers and the merchants of this product—transportation.

There may be three varieties of transportation—good, indifferent and bad. Our salesmen in the form of platform men may be good, polite salesmen—or just platform men.

If we are sure that our transportation service is good service, that our platform men are good salesmen, then by all means let us use all the modern methods of publicity to tell the facts to our customers.

But if we are not so sure of our service; if we are rather in doubt about some of our salesmen—then we must get busy and remedy the defects.

It stands to reason that we cannot sell something we do not have—and all the publicity in the world will not make good service out of bad.

Let's Have an Exhibit of *All* Kinds of Rolling Stock

THE bus manufacturers have inspired some new thinking among railway men and car manufacturers. They cannot take credit for it exactly, nor is it to their discredit. It is simply that with 25 per cent of the exhibit space occupied by buses at last year's convention, and with the applications for 35 per cent of the space so far this year coming from bus manufacturers, railway men have sensed the fact that it is not too expensive, nor are new cars too much like the same old thing, to make the exhibition of the latest developments in railway car design worth while.

The bus has the great advantage that it can be run right into the convention hall and that it is so readily mobile anywhere. The facilities are not good at Atlantic City for exhibiting cars, as they must be shown on the near-by streets. But the car builders have much to show that is new, and attention can be directed to their exhibits even if off the pier.

Britton I. Budd, president of the association, has tentatively planned to exhibit a train of the new cars of the Chicago-Milwaukee line, probably including a dining car, a parlor-observation car, a standard coach and a combination baggage and passenger coach. A number of other electric railway companies might with profit to the industry exhibit one or two of their latest designs of cars. For example, the Interstate Public Service Company might exhibit one of its new sleeping cars and a club car. There ought to be exhibited one of the new Detroit type articulated units. The Chicago Surface Lines could well show its latest design of one-man, two-man car recently ordered. The Indiana Service Corporation might show its new 51,700-lb. interurban car. The new double-truck Birmingham car weighing only 564 lb. per seat, with its new race separation arrangement, would interest all the Southern railway men. The Minneapolis company has a car which has been widely referred to in the newspapers as a "noiseless car." Delegates would be interested to see what there is to this popular appeal. It certainly is a great accomplishment, if true.

In general, there is no reason why a railway which has made some progressive development should not show it to the rest of the industry. In other words, the railways themselves should be willing to help push modernization in the industry as well as the manufacturers. No one builder can afford to show more than two or three cars to the convention, but if the railways would take up a little of this burden, we could have a real exhibit of rail cars as well as buses.

Railways Seek Use of Streets in Way to Serve Greatest Number

AMONG automotive industry men there is a common imputation that electric railways want every one else kicked off the streets so that they can have unobstructed right of way.

It is unfortunate if some of the advertising put out by the electric railways in the effort to educate toward relief of traffic congestion has lent itself to that impression, especially in the minds of men sensitive to anything which would tend to limit the use of the streets by other types of vehicles. The tone of some of this advertising has possibly been too sweeping and lacking in evidence of consideration of the other users of the streets. This point should be borne in mind in preparing copy.

Nevertheless, this paper believes that any entirely disinterested person will arrive at the conclusion that whatever is done to relieve congestion ought to give first consideration to the street railway, because in that way the greatest number of people are benefited. From three to five times as many people use the street by the railway as use it by all other vehicles combined. The street railway, with its cars and buses, is the backbone of the transportation facilities of any city. It supplies 250 rides per year for every city inhabitant, averaged over the country for all sizes of cities. In other words, 250 times the population of a city is the index of public benefit to be derived from any regulation making possible a faster operation of street cars. No other means of travel compares with this in the number of annual services performed.

Furthermore, faster operation of street cars resulting from such traffic rules redounds to the public in another way. To speed up a railway produces simultaneously one of the biggest economies and one of the best means of increasing the revenue. But as the railway is permitted under modern utility regulation to earn only a fixed rate of return, the faster operation then means that sooner or later a lower rate of fare will be in effect. The only way that the railway itself profits is that improvement of this sort may in some cases enable it to earn the allowable return, where under slower operation it is unable to do so.

If railway operation were strictly a private enterprise comparable with the business of manufacturing automobiles—in other words, if it were car manufacturers rather than railway operating men who were urging prohibition of parking, then there would be justification for the accusation in the opening sentence of this editorial. But the railway is a public servant. It uses the streets to transport people. It does not use them to store cars that are needed only at certain hours. In fact, it spends considerable money to get the cars to and from private storage yards so that they will not obstruct the streets when not in use.

The electric railways are not trying to hog the streets. They are not interested in any other use of the streets so long as it does not interfere with the service they are trying to perform for the public at large. They are interested in ways and means to speed up all moving traffic, as this would reduce interference with the cars. So long as there was street capacity to spare they did not oppose the parking of automobiles. But with the full street capacity needed there is scant justification for the use of any portion of it as a garage, as this presents a serious interference to the movement of all traffic.

It is unfortunate that the railways have to work toward an end which is unpopular with all regular automobile users and with the manufacturers behind the automobile. But some one has to champion the transportation requirements of the great bulk of the population, and that lot falls to the electric railway.

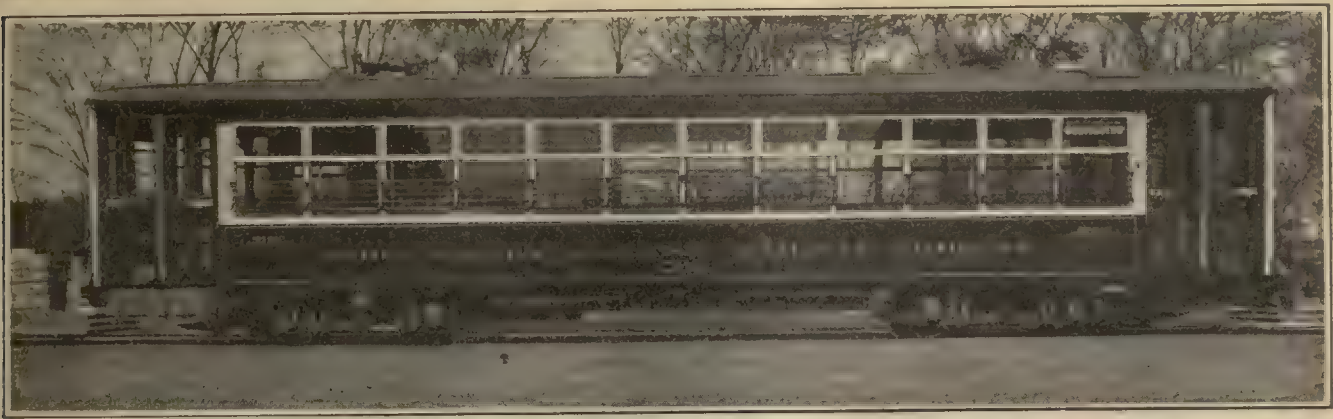
Let's Stop "Talking Poor"

SOMEWHERE there is a place loosely described as being between the devil and the deep sea, and commonly reputed to be one of the most unpleasant localities known to man. It is just about in that position, however, that the electric railways have been during recent years with regard to making public their exact financial status. On the one hand if they adopted a cheerful tone, announced that they were making money and that future prospects appeared rosy, there was the likelihood of public agitation for lower fares. On the other hand if they continually used the plea of poverty in order to get more reasonable fares, preserve existing fares, or get rid of some onerous taxation burden, they were in danger of casting a dark shadow over the entire industry from the financial standpoint.

In this dilemma a good many executives felt that the need for more revenue or relief from certain obligations was immediate and that the harmful effect on the industry of "talking poor" was remote. For that reason we have been hearing for some years past a good deal about the poverty of the electric railways. This has produced an unfortunate impression in the public mind which has been harmful to the industry.

"What is going to become of the electric railway?" the man on the street reasons to himself. "They say they're not earning any money and can't afford to make improvements. An industry that does not go forward, goes backward. If the electric railways are not going forward it must be because their day is about over." Thoughts of that kind tend to undermine public confidence in the railways as a medium of transportation.

As a matter of fact conditions are not nearly so black as they have sometimes been painted. Even in their worst years the electric railways spent enormous sums of money on the maintenance of their rolling stock and track. They are spending a great deal more today. More track is being reconstructed; more new cars are being put in service, and, best of all, more people are riding in the cars than ever before. A more or less satisfactory rate of fare is in vogue in most places. If there was a time when we needed to tell how hard up we were, that time has largely passed, as we have the higher rates of fare and some relief from unfair burdens. So let's stop "talking poor" and sound a note of prosperity. That is what we need now, to bring new money into the industry for capital improvements.



The Railway Lines in Huntington, W. Va., Have Been Completely Re-equipped with Cars of This Type

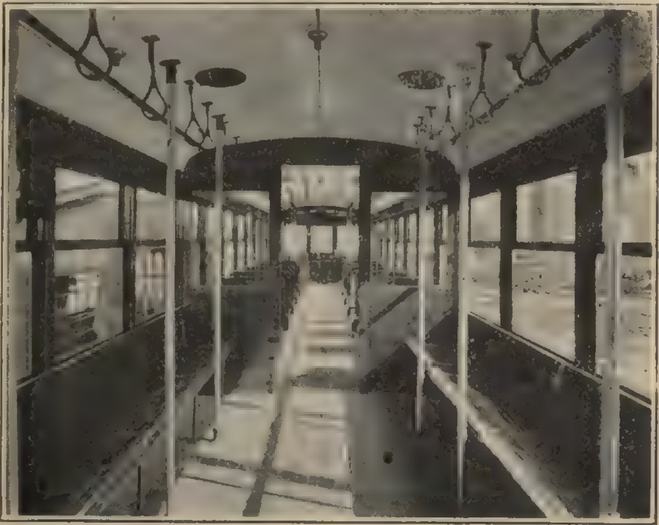
Modernizing Electric Railway Service in Huntington

Ohio Valley Electric Railway Has Replaced Old Cars with Modern Light-Weight One-Man, Two-Man Cars on All Lines—Schedule Speed Has Been Increased 17 per Cent—Maintenance Costs Have Been Reduced

UNTIL a short time ago the Ohio Valley Electric Railway, Huntington, W. Va., like many other electric railways, was operating a miscellaneous lot of rolling stock. This old equipment was of various ages and various types. There were some small cars and some big cars, some old cars and some comparatively new cars. All of the cars, however, were very heavy and caused rapid wear of the trackwork. In order to give better service and also to prolong the life of the track the railway bought 40 new cars, enough completely to re-equip all its lines on the south side of the Ohio River. These new cars have made it possible to give better and faster service at lower cost.

The railway serves a community of about 125,000 people covering a distance of 25 miles on the West Virginia and Kentucky side of the Ohio River. City service is supplied in Huntington, a town of about 75,000 population, and one local line is operated in Ashland, a town of about 15,000 inhabitants. Interurban service is operated between Huntington and Ashland. On the other side of the Ohio River, with no physical connection to the Huntington lines, the same company operates several miles of electric railway through Ironton.

Ashland and Ironton are large steel manufacturing centers. Huntington, on the other hand, is a city of widely diversified industry. The West Virginia industrial plants operate on Eastern time, while the Kentucky and Ohio plants operate on Central time. It thus happens that the hours of the factory workers are so arranged that the manufacturing plants do not all start work at one time. For this reason the railway is able to handle the factory employees with only a few extra cars, the regular all-day service being nearly sufficient for this purpose.

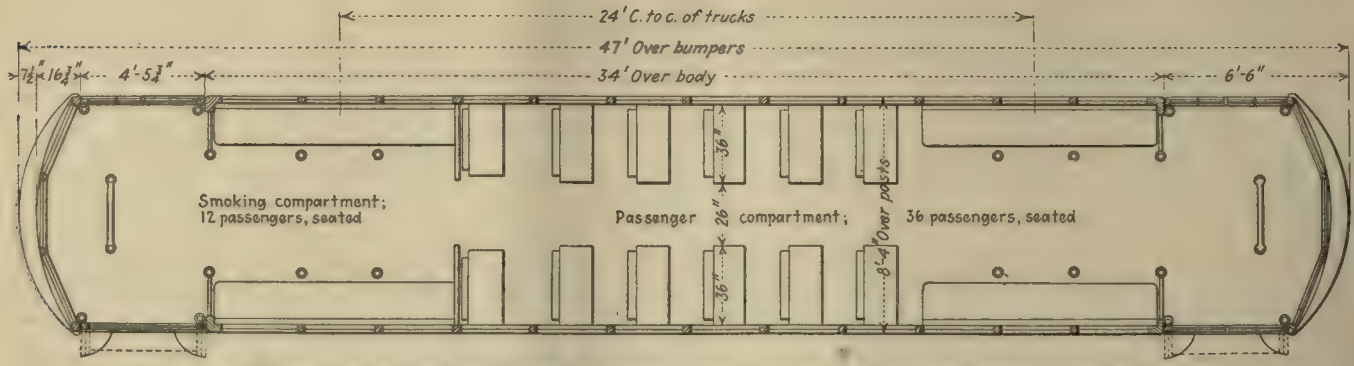


A Light Bulkhead Separates the Smoking Compartment from the Rest of the Car

The tracks of the Ohio Valley Electric Railway were in general in very good shape at the time when it was decided to purchase new rolling stock. A great deal of work had been done during the preceding ten years, and this was reflected in the good condition of the roadbed. In some places, however, the track was beginning to show signs of wear on account of the operation of extremely heavy cars. Many of these weighed as much as 58,000 lb. and the lightest weighed over 39,000 lb. The new cars weigh only 34,000 lb.

About the time when the wear on the track was first coming to the attention of the officials of the railway it was thought that faster schedules were needed in Huntington and on the interurban line. Relations between the public and the company had been very friendly throughout this area, and it was felt that it would be a wise move to foster this spirit by improving the railway service. The idea of forestalling possible jitney competition was also an important factor.

It was therefore decided that in order to provide faster service and to reduce the regular maintenance cost and power consumption the railways should be re-equipped with 100 per cent new rolling stock. A car suitable for all the various kinds of service operated by this company was selected and



Floor Plan of New Cars of the Ohio Valley Electric Railway, Showing the Smoking Compartment at One End

40 new cars of this type were purchased. The old equipment was sold to other railways, except three cars, which were retained for service on the Ohio side of the river, which is not physically connected with the West Virginia and Kentucky side.

THE NEW CARS HAVE BEEN DESIGNED FOR CITY AND INTERURBAN SERVICE

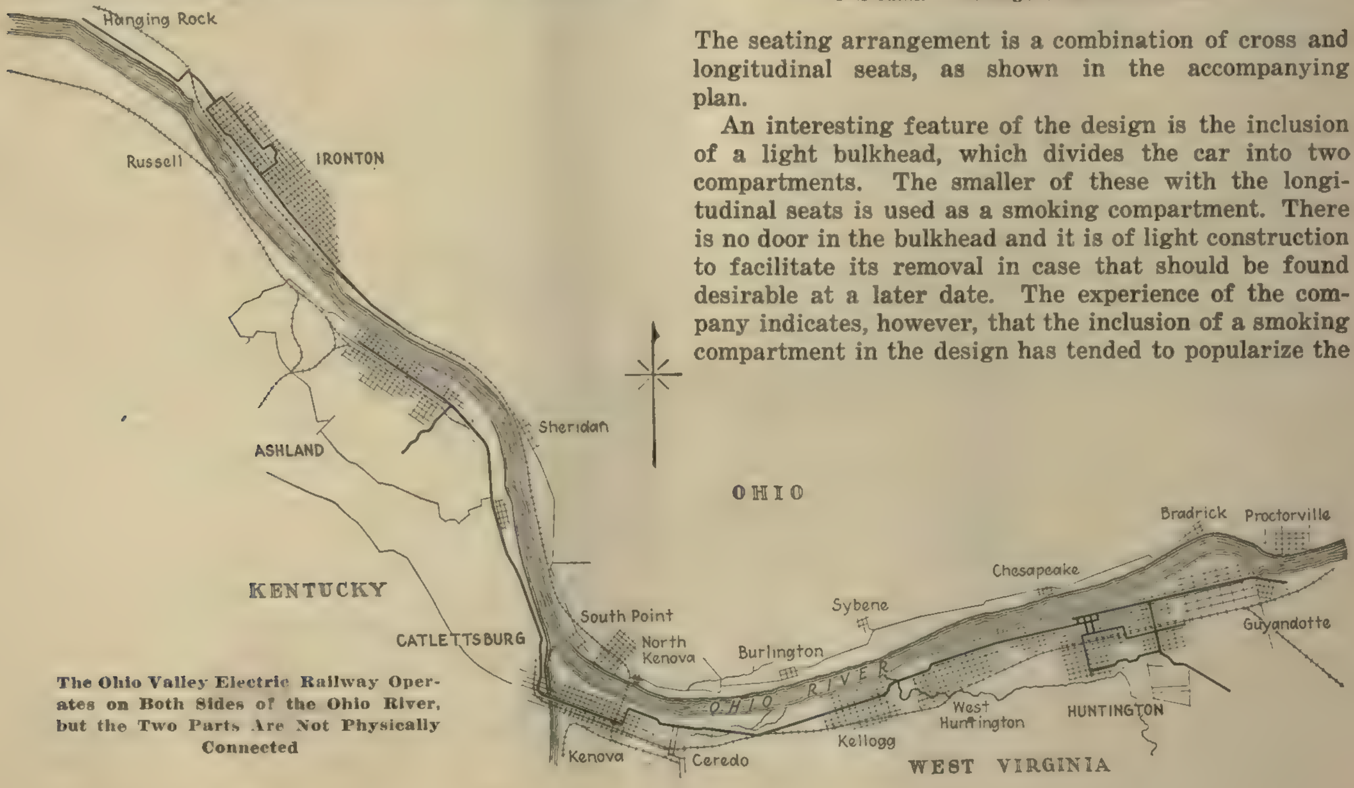
The new car is a typical light-weight one-man, two-man car. It is 47 ft. in length over all and will seat 48 persons. The length is a compromise between that needed for city service and that desired for the interurban route. It was thought more desirable to adopt a single type car, slightly larger than would be needed on the local lines, and possibly a little smaller than would be most advantageous on the Huntington-Ashland route, rather than to divide the purchase into two lots of different lengths. The operating economy of having a standard car in use all over the system was thought to be of greater importance than the excess weight which has to be carried around because the city cars were not of absolutely minimum size.

In interurban service the cars are operated by two men, while in local service they are operated as one-man cars. They are of the double-end type and are equipped with four Westinghouse 510-A, 35-hp. motors per car.

In Local Service the New Cars Are Operated by One Man. Passengers Enter at Front

The seating arrangement is a combination of cross and longitudinal seats, as shown in the accompanying plan.

An interesting feature of the design is the inclusion of a light bulkhead, which divides the car into two compartments. The smaller of these with the longitudinal seats is used as a smoking compartment. There is no door in the bulkhead and it is of light construction to facilitate its removal in case that should be found desirable at a later date. The experience of the company indicates, however, that the inclusion of a smoking compartment in the design has tended to popularize the



The Ohio Valley Electric Railway Operates on Both Sides of the Ohio River, but the Two Parts Are Not Physically Connected

service. Huntington is a rather long and narrow city, yet the distances are not so great but that many people could walk if they had any good reason for so doing. The fact that they can smoke as they walk was thought to be influencing many men to neglect the railway service. This was particularly true of men going to work in the morning. Some idea of the strength of this inclination was obtainable from the fact that many men used to let the local cars pass by and take interurban cars for short rides because the latter were provided with smoking compartments.

Another feature intended to appeal strongly to the traveling public and to encourage railway patronage is the ample knee room provided. Window posts are spaced 33 in. apart. This is particularly desirable in the territory through which the Ohio Valley Electric Railway operates because it caters to many travelers. If the seats are sufficiently far apart so that their luggage may be kept out of the aisle inconvenience to the passengers is avoided.

On the Ashland Division, which is almost all interurban lines, where 12 cars were formerly operated, 10 new cars now provide the same service. This means an increase of approximately 17 per cent in schedule speed, due to better acceleration with the modern motors. The use of Nachod signals along this line has also been a factor in speeding up the service. A few minor track changes have also been made to improve the service. For example, in Ashland the former shuttle service now runs all the way down town to the business district.

Maintenance costs have been reduced since the purchase of new equipment and power consumption has decreased. In connection with the latter phase of the question, however, the fact that the new cars are equipped with electric heaters instead of the old-fashioned coal heaters has had a tendency to increase somewhat the total consumption of energy.

Utility Courses Established in Illinois

SPEAKING before the executive committee of the American Electric Railway Association on June 20, President Britton I. Budd, president Chicago Rapid Transit Company, told the committee of the plan that has been worked out with the University of Illinois to establish a four-year public utility course, which will train men to enter the utility field. A public utility fellowship has also been created whereby the university will be able to pay partially or wholly the cost of a one-year post-graduate course in public utility research. A public utility school is also to be established at Northwestern University and a new hall built to house it. The personnel requirements of the public utility field are becoming so great that Mr. Budd thought it quite fitting that the industry should be dignified by a public utility department at the principal schools. It is apparent what a tremendously important thing it is to have the younger generation coming from the colleges versed in the true economics and facts regarding the utilities. Such a plan has been discussed a good deal, but it is actually being carried out now in Illinois. It will require that the utilities co-operate not only by employing graduates of the course but by providing lecturers and otherwise stimulating interest.

Statistics on Twelve Large Properties

FOLLOWING the practice of several years past the ELECTRIC RAILWAY JOURNAL presents herewith statistics showing a comparison between six of the largest surface lines and an equal number of rapid transit properties. Corresponding statistics for 1922 were published in the issue for Nov. 24, 1923, page 891. These comparisons are of special interest when compared with the results of the electric railway industry as a whole, such as the data given in the issue of this paper for May 3, 1924, which included an analysis of operations on 114 city properties. The size of the selected twelve companies may be judged from the fact that they produced gross eearnings of more than $328,000,000 last year, while the 114 properties showed a total of about $370,000,000. These twelve properties also operated one-ninth of the track mileage in the United States. While six of the companies are classed as rapid transit, only three operate elevated or subway lines exclusively, the other three having a combination with surface lines. The average receipts of these companies exceeded $26,000,000, each being above $8,000,000 in annual earnings.

Gross earnings of the six surface companies showed an increase of 4 per cent above the previous year, while operating expenses, including taxes, increased 6.7 per cent. For the rapid transit group the increases were 5.8 and 4.5 per cent respectively. The operating ratio, including taxes, for the surface companies averaged 82.87 per cent, as compared with 83.34 in the previous year, and ranged from 74.76 to 94.72 per cent. For the rapid transit lines, the average operating ratio was 72.40 per cent compared with 71.63 in the previous year, and ranging from 60.05 to 79.13. Selecting the three roads which operate only elevated or subway lines the average was 68 per cent, as against 69.17 previously.

Less service was rendered by each car on the surface lines, the "annual miles operated per car" averaging 31,752 as compared with 34,877 in the preceding year. In the rapid transit group there was an increase, the figures being 41,809 and 39,271 respectively. The "total passengers per mile of single track operated" showed an increase of 10.4 per cent for surface and 8.5 per cent for rapid transit lines. The number of such passengers ranged from 952,045 to 2,489,535 on the surface properties and from 1,349,253 to 1,579,666 on the rapid transit properties. It should be noted, however, that several companies, particularly in the rapid transit group, do not keep account of transfer or free passengers, and for that reason some of the figures are too low. Revenue passengers on surface lines increased 4.8 per cent while the car mileage was increased 3.4 per cent. In the rapid transit group the revenue passengers gained 7.2 per cent, while there was an increase of 8.2 per cent in mileage.

STATISTICS PER CAR-MILE AND PER CAR-HOUR ON TWELVE LARGE ELECTRIC RAILWAYS

	Six Surface Roads					Six Rapid Transit Roads				
	1919	1920	1921	1922	1923	1919	1920	1921	1922	1923
Transportation revenue per car-mile, cents	38.9	44.7	47.8	47.8	48.3	33.1	38 0	38.0	40 8	39.4
Expenses and taxes per car-mile, cents	32.5	37.6	43.2	43.2	43.4	25.9	30.6	33.4	31.1	32.3
Transportation revenue per car-hour, dollars	$3.26	$4.00	$4.03	$3.14	$4.11	$4.21	$4.63	$5.21	$5.14	$4.85
Expenses and taxes per car-hour, dollars	$2.75	$3.37	$3.62	$3.64	$3.59	$3.25	$3.70	$4.13	$3.81	$3.84
Operating ratio, per cent	83.06	87.45	85.08	83.34	82.87	74 00	77 26	77.92	71.63	72.40

Detroit Enlarges Shops

The Paint Shop Finished Last Year and the New Mill Under Way Have Increased the Shop Area 40 per Cent—A Recent Trip Through the Shops Disclosed a Number of Interesting Practices

LAST year the Department of Street Railways, Detroit, added a paint shop, 175 ft. x 235 ft., to its group of shops at Highland Park. This year it is erecting a new mill, which will occupy an area of 175 ft. x 286 ft. The bids are all in on the steel work and the contract will be let shortly. With these two buildings the shops at Highland Park will be increased in area about 40 per cent. When the mill is completed, some shifts will be made in the arrangement. In the meantime, certain additional equipment will be purchased, including bulldozers and oil furnaces. Other improvements contemplated include the speeding up of tools through the installation of forced lubrication on all drill presses and probably on all lathes.

The paint shop, described in the ELECTRIC RAILWAY JOURNAL for June 2, 1923, page 923, is now in full operation. Cars are being repainted in the shop now at the rate of from 75 to 80 a month. Canary yellow has been adopted as a standard color, and the repainted cars carry on the main panel the official seal of the city, put on by the decalcomania process.

A feature of the paint shop, as will be remembered from the previous article, was the method of supporting the scaffolding by brackets swiveled around the supporting posts of the building. The counterweights for these brackets were inside these supporting columns. It has been found that while this plan is very compact, the spacing of the supporting columns, 17 ft., requires rather a long scaffold board. To prevent their bending these boards have to be trussed, and two men are required to shift them.

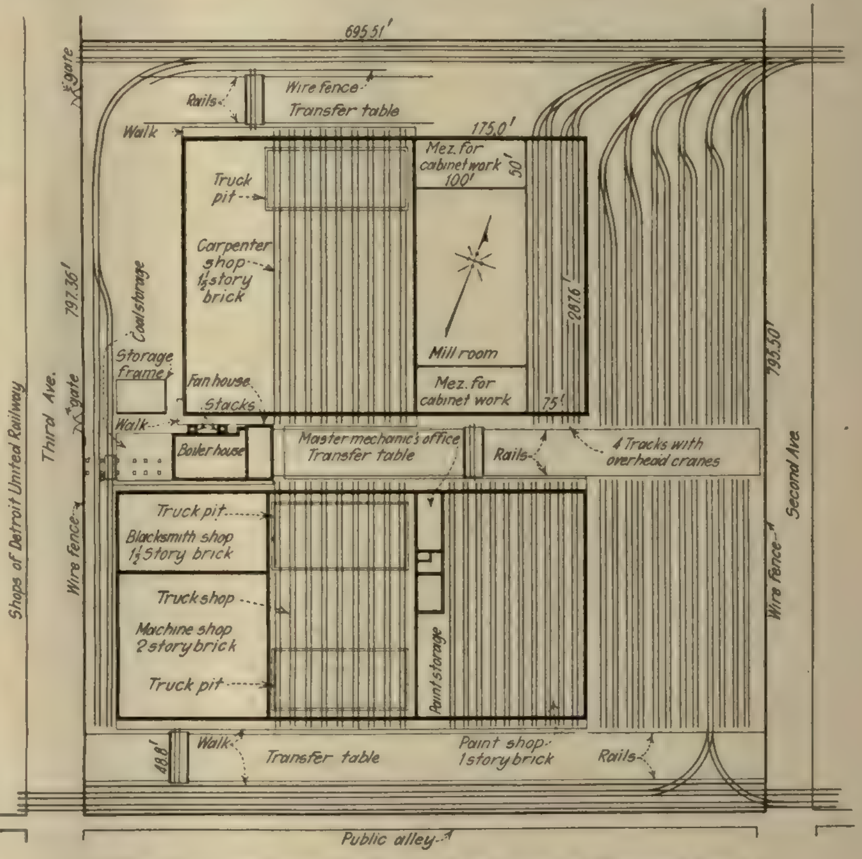
With the added facilities better work is being turned out at the shop. A year ago the average number of cars in the shops for defects was about 110. During the current year the number has been reduced to as low as 43, thus releasing 67 additional cars for passenger service. The record of armature failures is equally satisfactory. During the first year of operation the average number of armature burnouts was 77 a month. Recently the average has been about 37 a month, or less than half the original number. The improvement in this performance is due almost entirely to the practice of dipping and baking armatures, which was adopted two years ago. A recent trip through the shop disclosed the following interesting processes:

PAINT SHOP

Trucks Cleaned by Water Jet. Trucks are cleaned for repainting by the use of a water jet under a pressure of 60 lb. per square inch. This seems to remove the accumulated dirt and grease so thoroughly that the trucks are then ready for repainting. The water is ejected through a ¼-in. water nozzle to which a ⅛-in. air pipe from the shop supply at 60 lb. pressure is connected. The process of cleaning for a pair of trucks takes about 25 minutes.

Spray for Rattan Cushions. The spray method of painting is used extensively in the shop for car body painting. Rattan cushions are also painted by the spray process, but this work is done within a cabinet connected with an exhaust, so that the paint spray which does not stay on the rattan is discharged above the roof.

The cabinet is about 9 ft. long and 4 ft. high. The front is in three parts, the center lifting off and sides sliding back. While the cushions are being sprayed, the cabinet is closed with the exception of the middle opening, through which the spray guns are operated.



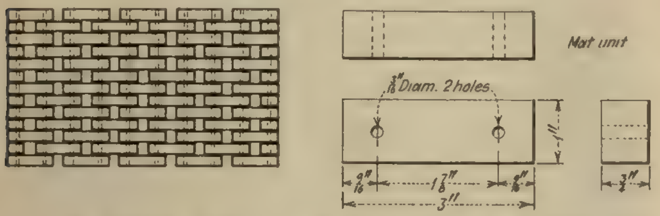
With Additions Under Construction the Shops at Highland Park Are 40 per Cent Larger than Two Years Ago

Sash Frame. A rack for holding freshly painted sash until they dry is another feature of the paint shop. The rack is of channel iron braced and just the size to hold a dozen or fifteen freshly painted sash.

Wooden Mats. Extensive use is made in both the paint shop and in the machine shop of wooden mats on which the men can stand while at work. These mats are made of a series of maple links, 3 in. x 1 in. x ¾ in., as shown in the accompanying drawing. These mats may be made in various widths, but the standard width is 2 ft. There are five standard lengths from 6 ft. to

10 ft. These mats are assembled with No. 9 gage wire and are found much easier for the feet than the concrete floor. At the same time they can be rolled out of the way when the floor is cleaned and they themselves are practically self-cleaning.

Paint Mixing Table. A separate fireproof room adjoining the main paint shop is used for paint storage. A feature of this room is the mixing table, above which are carried, on a frame, 5-gal. cans holding the most commonly used solvents, namely, turpentine, japan, raw oil, turpentine substitute, boiled oil, and enamel oil. Views of this mixing table and of the main row of paint cabinets accompany this article. The 5-gal. cans in the rack over the mixing table are fitted with a special kind of gate valve. This makes it very easy for any painter to draw off as much of any one of the solvents in these cans as he requires while mixing his paint.



This Wooden Mat Is Used Extensively in the Shops. It Is Very Easy on the Feet

When canary yellow was adopted as the standard color for the body of the car, letterboard and roof, dark red was adopted for the sash. Experiments showed, however, that if the side posts were painted yellow for their full height, the contrast with the color of the sash gave a rather divided-up appearance to the side of the car. In consequence, the upper part of the posts, i.e., between the upper sash, are now painted the same color as the sash, giving a streamline effect.

MACHINE SHOP

Building Up Sharp Flanges. The cars in Detroit are single ended, and the steel wheels used tend to develop sharp flanges, two diagonally opposite wheels of the truck usually wearing in this way. These flanges are built up with an automatic arc-welding machine, the whole operation requiring not much more than an hour. The metal from the arc is deposited on the throat and the inside of the flange, no attempt being made to build up treads in this way. The built-up parts are then ground to shape on a Norton emery grinder.

Dirt Guard for Gear Case. To keep dirt out of the gears, the Detroit system is using on the gear case a dirt guard somewhat similar in principle to the dust guard used on car journals. The gear-case guard is stamped out in the form of a disk, which is cut in two to make the two halves. It is then welded to the gear case. An accompanying drawing shows the construction for a gear case of this kind adapted to one-man cars.

Riveting Tips on Control Fingers. A punch press cuts off old studs from controller fingers and rivets on new ones. Both processes are performed with the same die. When turned in one direction, it shears off the old stud, and when turned in the other direction, it forms the die for riveting the stud.

Removable Scrap Receptacles.—A system has been developed for the handling of scrap material about the shops which entails the use of a standard box approximately 6 ft. long by 4 ft. wide by 3 ft. high. These boxes are equipped with lifting loops and with legs of suitable height to accommodate a transveyor truck. In this manner they may be handled by crane or transveyor truck. The boxes are loaded on flat cars, taken to the dump, unloaded by crane and returned to the shop. By this means the handling is reduced to the lowest possible amount.

It is contemplated to use this same system of boxes for the delivery of material to the carhouses and the return of scrap and material for repair. Outgoing supplies will be placed in individual boxes for each carhouse. When the supply car arrives these will be swung aboard and will be unloaded at the carhouses by means of a jib crane on the car. This method will reduce the amount of handling and will speed delivery.

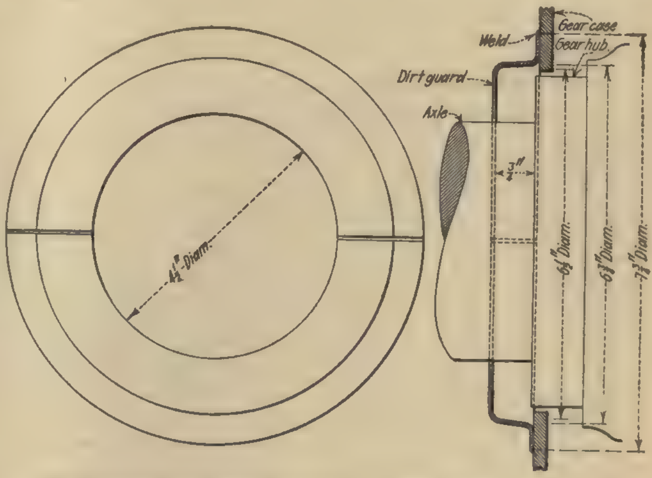
Case-Hardened Pedestal Guides. All car journal boxes which come in for repairs are now being fitted with case-hardened pedestal guides. The old guides are removed and the new guides are welded in place.

Turret Lathes for Bearings and Trolley Wheels. A turret lathe is now being used to machine bearings, so that they can be finished in two operations and much more quickly than with engine lathes. The turret lathe will also be used for shaping up trolley wheels after they have been rebushed.

A new fixture is being designed for holding axle bearings while they are being machined. By its use, it is hoped, the machining on the bearings will be so uniform that it will not be necessary in the future to mate these bearings while they are being made.

Soundproof Room for Testing. In the armature department a soundproof room has been partitioned off, in which field coils are tested with a Century field tester. It has been almost impossible to operate this tester satisfactorily in the open room. Now work can very easily be carried on with it.

High-Voltage Test for Cars. While some light repairs are made in the carhouses, a good many of the cars which need only light repairs go to the shops. It has been the practice for the last few months to put all of these cars through a high-voltage test. The control handle is put on the first notch and a 1,500-volt a.c. circuit is applied to the wiring. This has proved a very rapid way of discovering weak points in the wiring, points which would give trouble probably within the next few weeks, if the car was sent out on the road without this test. In a recent month 30 cars succumbed to this voltage.



Dirt Guards Are Being Welded on Gear Cases in Detroit

Sand Blast for Commutators. In the armature room a sand blast is used for cleaning commutators as well as for cleaning armature cores. A new sand-blast machine to work in a dustless manner is being developed.

Platform for Motor Frames. Motor frames, when brought in for repair, instead of resting on the floor, are set on individual platforms just large enough to hold a motor. These platforms are of wood, with strap-iron legs so that they are 8 or 10 in. from the floor. In this way a lift truck can very easily be run under them, lifting the platform and motor and being then run to any convenient part of the shop. With the motor on the platform it is very easy to work on and around it.

Standardizing Grids. By standardizing motor resistance grids, the number has been cut down from 14 to 3. Only one standard grid frame now is used.

THE WOOD MILL

Outside and Inside Steel Panels for Cars. In the mill a number of interesting practices were observed. The wooden side panels of old cars are being protected as the cars come into the shop by steel plates. These plates are of about No. 15 gage and are screwed on over the old wooden panels. The side molding or belt rail is taken off to simplify the application. End plates are applied to the ends of the car.

Steel cove panels or heel boards are also being used on the inside of all cars fitted with longitudinal seats. The lower part of this heel board is concave to make a sanitary base and to facilitate sweeping. The panels to fit end circular seats are welded together before being inserted, but the panels for the side seats are put on individually. Of course they contain openings opposite the heaters.

Extra Door Added to Birney Car. When it started operations, the department purchased a large number of standard double-end Birney cars, as these cars at that time were greatly in vogue. It has been found, however, that they are very slow in loading and unloading, and at one time the department was afraid that it might have to give them up. Most of these cars now, however, are being made serviceable by the addition of a second door, which is cut between the posts just back of the original door. This change is being applied only to cars which run on lines with loops, so that they can run as single-ended cars, but most of the lines in Detroit are adapted to single-end equipment. One seat had to be sacrificed by this change, but as the cars are changed to single end, it has been found possible to put seats on the back platform, which increases the seating capacity of the car by eight seats.

This Mixing Table for Paint with Solvents Above Saves the Time of the Painters

Saw Filing and Setting Machine. For filing and setting bandsaws, the department uses an automatic machine manufactured by the Wardwell Manufacturing Company of Cleveland. Each end of the bandsaw is rolled on a large wooden reel, and this machine files and sets the teeth at the same time.

Cabinets for Grease. A number of cabinets for holding grease barrels were also noticed in the shop. They are of steel and hold the grease barrels at the carhouses. At the top of the cabinet is room for placing buckets. These cabinets have the threefold advantage that they keep the dirt out of the grease and buckets; they look better than the exposed barrels and buckets, and there is a distinct benefit in fire protection.

Portion of Main Row of Paint Cabinets at Left; Close View of Row of Solvent Cans and Mixing Table at Right

Trends in Electric Railway Equipment

Smaller Wheel Sizes, Double-End Control, Double Trucks, Four Motors per Car, Lower Weight per Car and Smaller Size Motors Are Trends Shown by Motor Sales

By G. M. Woods

General Engineer Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.

AN ANALYSIS of railway equipments sold by the Westinghouse Electric & Manufacturing Company during the past ten years discloses several tendencies of general interest. In studying the accompanying graphs it must be remembered that the records of only one manufacturer form their basis and that in the case of some orders complete data were not available. Further, several unusually large orders of a certain type of car in one year may cause a peak or depression in the general curve. However, the number of motors involved is large, and it is believed that the tendencies indicated are approximately the true condition.

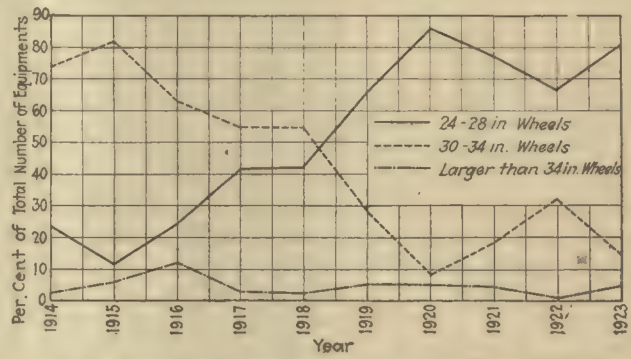


Fig. 1—Trend of Wheel Size as Shown by Motor Orders During the Past Ten Years

Fig. 1 shows the change in wheel size which has taken place during the last ten years. In 1914 23 per cent of the equipments sold were for 24-28 in. wheels and this percentage decreased to 12 per cent in 1915. In 1920 the maximum percentage of 86 was reached. During the last four years the percentage varied between 67 and 85. The main increase in the use of small wheels from 1916 to 1920 may be attributed to the single-truck safety car. The general increase is due partly to the decrease of heavy interurban cars sold during the period considered and to the more general use of low-floor cars in city service.

The trend of 30-34 in. wheels is almost directly opposite to the trend of 24-28 in. wheels because the number of equipments for wheels more than 34 in. in diameter is very small and has been steadily decreasing. The percentage of equipments with 30-34 in. wheels decreased from 73 in 1914 to 15 in 1923.

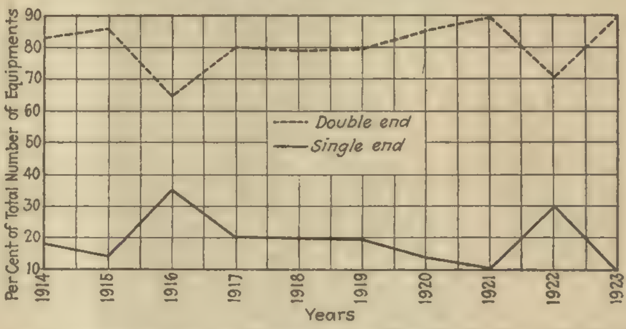


Fig. 2—Proportion of Equipments with Single-End Contro. and Double-End Control

PRESENT INCREASING TENDENCY TOWARD DOUBLE-TRUCK CARS

Fig. 2 shows the percentage of equipments with single-end control and the percentage with double-end control. Except for minor variations the percentage of double-end control has kept very close to eighty. The increase in double-end control during 1920 and 1921 was due largely to the large percentage of single-truck, double-end safety cars sold during those two years.

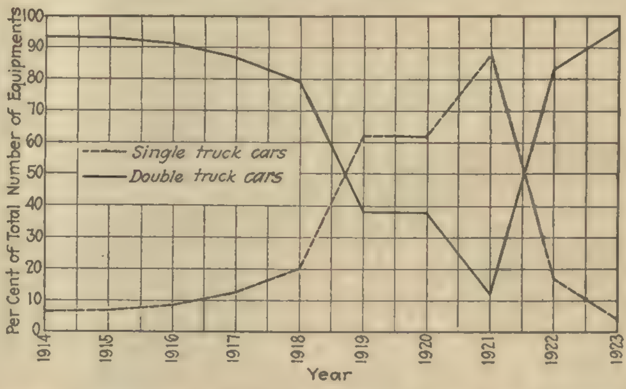


Fig. 3—Percentage of Single and Double Truck Cars, Showing Clearly the Advent and Decline of the Single-Truck One-Man Safety Car

Fig. 3 shows the percentage of double-truck cars and the percentage of single-truck cars for which equipments were sold each year. The percentage of cars which were double truck was between 90 and 95 per cent from 1914 to 1916. The percentage then gradually decreased until in 1921 a minimum of 12 per cent was reached. The sale of double-truck cars then increased, being 83 per cent in 1922 and 95 per cent in 1923. The percentage of equipments for single-truck cars, of course, followed the opposite tendencies. It should be remembered that while comparatively few single-truck safety cars were sold in 1922 and 1923, there were sold a large number of double-truck cars arranged for one-man operation. It is very doubtful if one-man operation would be extensively used in this country today had it not been for the successful operation of the single truck safety car.

The increasing tendency to use quadruple equipments instead of double equipments on double-truck cars is shown by Fig. 4. For the first four years of the period analyzed the numbers were fairly evenly divided. During the last six years the majority of double-truck cars have been equipped with four motors, although minor fluctuations in percentage have taken place. The use

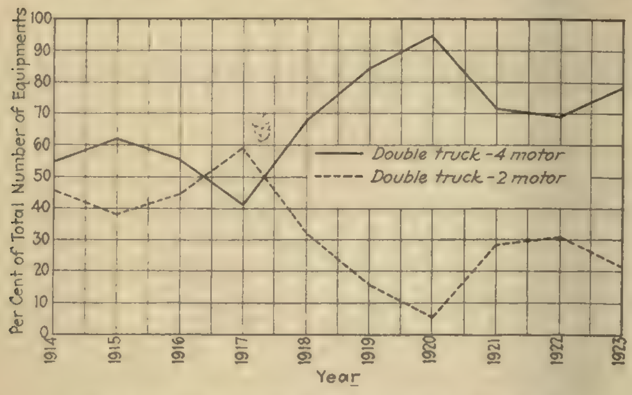


Fig. 4—Trend in Use of Two or Four Motors on Double-Truck Cars

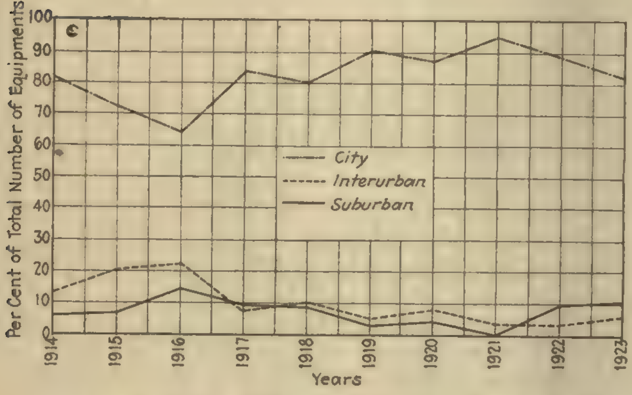


Fig. 5—Division of Motor Sales Between City, Suburban and Interurban Cars

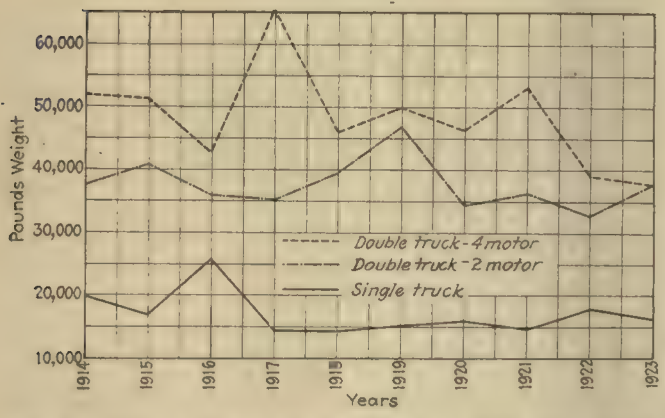


Fig. 6—Average Weight of Double and Single Truck Cars, Showing Four and Two Motor Equipments Separately

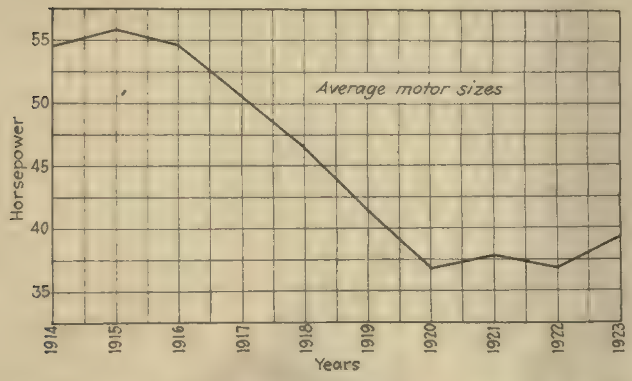


Fig. 7—Average Size of Motors Has Come Down with Weight Reduction and Tendency Toward Smaller Wheels and Four Motors

of quadruple equipments has been brought about by the greater importance of rapid acceleration under modern traffic conditions and the use of low-floor cars with wheels of small diameter.

Double-truck cars in all classes of service are included in the numbers of cars on which Fig. 4 is based. If city cars only were included, a smaller per cent than shown on the curve would have quadruple equipments because practically all interurban cars are equipped with four motors. The number of interurban cars sold in any year is relatively small, and the trend shown by Fig. 4 is not materially affected by their being included.

Fig. 5 shows the percentages of equipments sold for city, interurban and suburban service. The city equipments, of course, form the major portion of the sales. The actual number of interurban cars purchased increased during 1922 and 1923 as compared with 1921. The future of the interurban business seems to depend on two different kinds of passenger service. The first is a high-speed service with heavy cars which can successfully perform the kind of service desired by city-to-city passengers. The second is a frequent, convenient service with light-weight cars which can bring back the passenger traffic lost to the automobile. Most interurban roads can also materially increase their revenues by engaging more actively in freight haulage.

CAR WEIGHTS HAVE BEEN REDUCED

The decrease in weight of all classes of cars is shown by Fig. 6. The greatest saving in weight has been made in the double-truck cars with quadruple equipments. This decrease has been brought about by the general use of low-floor cars with wheels of small diameter. There has been less decrease in the weight of double-truck cars with two-motor equipments. This lower rate of change may be because the cars with two-motor equipments were considerably lighter than those with four-motor equipments and there was less demand for weight reduction, or it may be that the users of two-motor equipments have adhered more closely to existing designs. Curiously, the average weight of double-truck cars equipped with two motors was the same in 1923 as the average weight of the cars equipped with four motors. The trend in weight of single-truck cars is also shown in Fig. 6. The sharp decrease in weight in 1917 was due to the adoption of the safety car. The gradual increase since that time has been caused by modifications of the safety car such as double doors, double floors, heavier body construction and heavier trucks.

The average size of motors sold during the ten-year period is shown in Fig. 7. The size of motor is determined by so many variables that it is difficult to account for any but general trends. The steady decrease from 1915 to 1920 was doubtless caused by the reduction in car weights, the use of four-motor equipment instead of two-motor equipments, the extended use of the light-weight safety car and the general application of ventilated motors with their greater service capacity than non-ventilated motors in proportion to nominal horsepower rating. It is significant of a more liberal tendency in motor applications, both on the part of the electric railways and the manufacturers, that the average motor horsepower has increased slightly during the last three years, although car weights have shown no general increase. Under-motoring is a very expensive form of economy for the operator as well as for the manufacturer.

Rochester Trackless Trolley Construction

The Line Is About 3 Miles Long and Runs Through a Densely Populated District—It Crosses Five Electric Car Lines and One Steam Railroad at Grade—Some of the Overhead Equipment Is of Special Design

THE Rochester trackless trolley line, 2.78 route miles long, operates probably through a more densely populated district than any other trackless trolley line built thus far in this country. It has also more overhead crossings than any other, as it crosses five heavy traffic electric car lines and one steam railroad line at grade. It is operated by the Rochester Railways Co-ordinated Bus Lines, Inc., which is controlled by the New York State Railways, the operator of the electric railway lines in Rochester. This company has done pioneer work in the development of material for the overhead line used by these trackless trolley buses. The experience in Rochester should be of interest to other companies operating or expecting to operate trackless trolleys.

OVERHEAD SPAN SYSTEM ADOPTED

The width of street between curbs on which the trackless trolley line in Rochester is built is from 24 ft. to 32 ft. The span construction is used with tubular steel poles, mostly 7 in., 6 in. and 5 in., set in concrete. The span wire is $\frac{5}{16}$-in. seven-strand Siemens-Martin wire, the same as used for span wire on the rail lines of the New York State Railways, and the trolley wire is No. 00 hard-drawn copper.

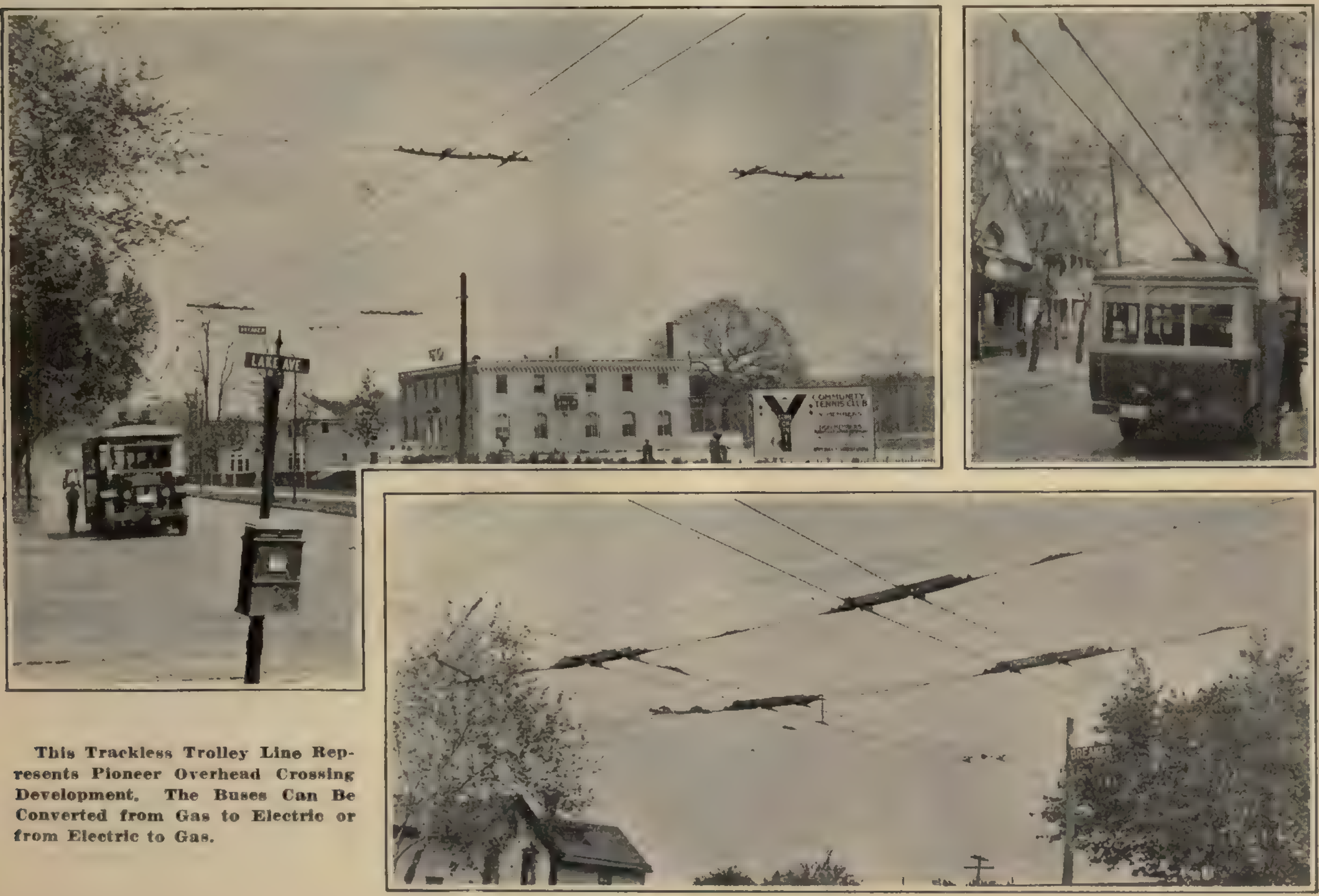
Each span, of course, carries four trolley wires, two positive and two negative.

It was decided that a 24-in. spacing between the positive and the negative wires on the same side of the street was desirable. These wires were located by taking the center of the street and placing the two wires, 24 in. apart, half way between the center line of the street and the curb on one side and the other two wires, the same distance apart, half way between the center line of the street and the curb on the other side. The height of the trolley wire above the surface of the street is the trolley standard of 18 ft. With trolley poles on the trackless trolley buses 18 ft. in length, this gives a swing of about 16 ft. on each side of the wire. This length of trolley pole is about 6 ft. more than on the standard trolley car in Rochester.

USE OF PORCELAIN STRAINS

Four standard porcelain strain insulators are used in each span wire. The arrangement is to put the two positive wires nearest the middle of the street and the two negative wires nearest the curbs. A porcelain strain is then cut into the span wire on each side of each negative trolley wire.

The positive wires are fed at all crossings with each railway line, and at one end, making six feed-in places in the 3 miles of route. Both trolley wires are sectionalized with regular section breakers about half way between the feed-in points, but these breakers are



This Trackless Trolley Line Represents Pioneer Overhead Crossing Development. The Buses Can Be Converted from Gas to Electric or from Electric to Gas.

jumped with four-strand No. 10 copper wire. This tends to equalize the rail line potential but if there is a ground, these jumpers will burn out.

The hangers, ears, etc., are the same type as used on the rail lines.

The negative trolley is grounded at each electric rail intersection by a piece of flexible cable carried down inside the pole, then under the pavement in a piece of creosoted pump log to the rail, to which it is bonded.

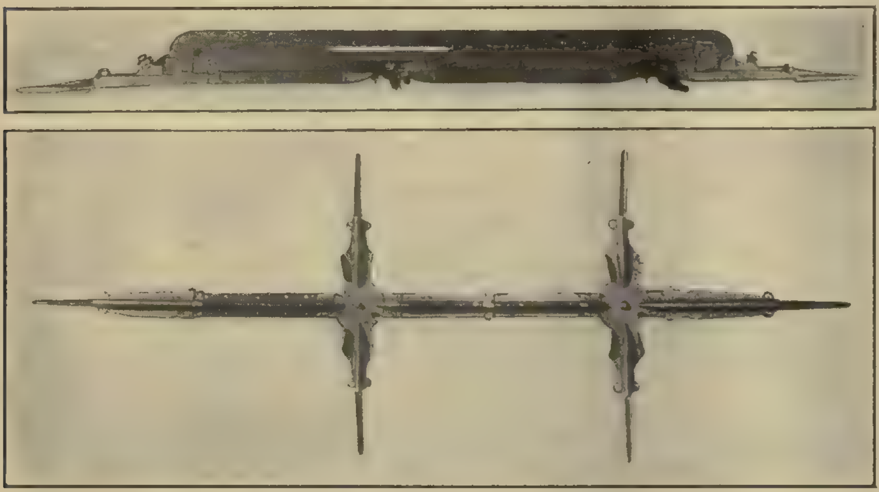
Where the wires cross steam railroad tracks, the trolley wires are carried 22 ft. above the rail, and trolley wire guards of the usual type are carried over them.

The rail lines are fed from different substations, but this does not interfere with the operation of either trackless trolleys or cars.

OVERHEAD CROSSINGS

The chief problem in the operation of the line has come at overhead crossings. These have caused no interference with the operation of the line, but the overhead line department has realized that here might be a weak point if care was not taken.

The first question was to decide whether at a trolley and trackless trolley overhead crossing the trolley or the trackless trolley should have a continuous crossing. At first the continuous crossing was put in for the car line and the trackless trolley motormen were instructed to coast over the crossing. It was thought that as there were fewer of them it would be easier to secure compliance with the regulation, but it was found that no matter which way the crossing was put up the motormen would get careless and occasionally would go over the crossing with the current on.



Side and Bottom Views of Overhead Crossing for Trackless Trolley Line Developed in Rochester

At first stock material was used for the crossing, but it soon developed that no matter which line was insulated an arc would sometimes be drawn where the gap was 6 in. or less. After extended study the company developed the overhead crossing illustrated.

The body frame of this crossing is a piece of hickory 50 in. long by 3½ in. high by 2¼ in. thick. Onto the lower part of this wooden block two standard insulated crossing plates are attached with 24-in. centers and connected by a fiber runner for the car trolley. This fiber runner is in two pieces to keep it from warping, and it is held at the ends in the crossing studs and in the center by a brass clamp. At each end of the wooden block is an end tongue to which the rail trolley wire is attached. This end tongue, at the positive end of the crossing is about 3 in. from the trackless trolley positive crossing, and the end tongue at the negative end is about 11 in. from the negative trackless trolley crossing. Between the negative crossing and the end tongue, to which the car trolley wire is connected, there is another fiber runner to carry the rail trolley wheel, but as this is only 11 in. long a brass clamp is not considered necessary here.

The rail trolley wire is carried over the top of the wooden block, to save cutting the wire, and the groove in which it lies has a cover to keep out the moisture. A slot 12 in. long by ⅜ in. wide is cut horizontally in the wooden block to increase its dielectric strength. The block is then painted thoroughly with black insulating paint or shellac.

At the positive end of the crossing the car trolley wire is electrically connected to the positive trackless trolley wire with a stranded copper bond. Stranded wire is used at this place to prevent breakage of the bond by weaving.

As will be seen, this crossing provides for continuous running of the trackless trolley rather than the car. This is partly because it is believed that a swiveled harp should have smoother running than an unswiveled harp, partly because the rail car is always directly under the wire, whereas the trackless trolley bus may have swung out, and partly because there are two men on the rail car, and if it should be stalled through a dewired trolley a crew of two men can more easily replace the pole than the one trackless operator.

At the eastern end of the line a loop has been built over private property, so that the bus simply runs around the loop. At the western end a wye has been built, as this end may be extended later.

THE BUS EQUIPMENT

The seven trackless trolley buses on this line are "convertible," that is to say, they can be changed, if necessary, to gas buses. When the New York State Railways bought this equipment it purchased from the Brockway Corporation twelve motor bus bodies and chassis capable of being equipped with either gas motor for independent operation or electric motor for trackless trolley operation. Originally seven of these buses were equipped with gas motors and five with electric motors. Since they were purchased last fall, however, two of the gas motor buses have been converted to trackless trolley, and it is the intention of the company to convert two others. The conversion is not difficult because it means simply the replacement of the gas motor with two Westinghouse 258 motors. These motors are arranged with the foot control, so that the operator can manipulate the steering wheel with his hand. The principal other change in the electrical equipment, as compared with the electrical equipment of a trolley car, is in the longer trolley pole used, the swiveled harp, which has four ball bearings, and the use of a 6-in. trolley wheel.

The gas and trackless trolley buses of the Rochester Railways Co-ordinated Bus Lines, Inc., have been in use only since Nov. 1, 1923, so that the management is unwilling yet to express its opinion positively as to the relative merits of the two kinds of motor power. In general, however, the following conclusions have been reached:

Under considerable density of traffic, where stops have to be made every two or three blocks, the trackless trolley is better than the gas bus, because it is more efficient and less noisy in acceleration. Possibly a headway of 20 minutes is the dividing line, trackless trolley being desirable for headways of less than this time and gas buses for more than this time.

The original investment for the trackless trolley is, of course, more, and the overhead system, as constructed in Rochester, costs about $7,000 per route mile. On the other hand, the operating expenses on a frequent stop line are probably less with trackless trolley. The power consumption on the Rochester trackless trolley line is only about 1 kw.-hr. per car-mile without heaters and 2 kw.-hr. with heaters, bringing the power cost considerably below what the gasoline bus would show. The oil consumption on the Rochester trackless trolley line is only 4 gills of oil in ten days. It is believed that the maintenance cost of the trackless trolley will also be considerably less, and the accounting department has been instructed to allow for a physical life of the trackless trolley buses of 18 years and for the gas buses of only 10 years. For both kinds of buses there is depreciation reserve charge for tires of 1 cent a bus-mile.

Track Maintenance Instruction

Eastern Massachusetts Street Railway Conducts Course in Track Methods at Opening of Season —About One Hundred Men Attend

FOR some years the Eastern Massachusetts Street railway has conducted a course on track construction and maintenance prior to the summer's work. Those who have attended are the roadmasters, track foremen and others connected with the way department, as well as the division manager and superintendent. Its purpose was to bring them up to date on the latest methods of the company. This year the plan was changed somewhat by shortening the course and printing an advance syllabus of it for distribution among the participants.

In all there were about 100 men who took the course. This number was divided into three groups, each made up of a certain number of men from each division, so that any one section of the road would not be weakened by having all of its responsible track men away at the same time. The meetings were held in the Chelsea shop, which was fitted up with a screen and stereopticon to show views of standard trackwork and interesting photographs of good and bad work taken during the previous year.

A half day was given up to each class and a class was held each week so that three weeks were required before all those scheduled to take the course could do so. This half day was divided into six periods of 30 min. each, and each period was divided into 20 min. for lecture or instruction and 10 min. for discussion. In the pamphlet describing the course and distributed in advance, blank pages were left between the different topics for notes or memoranda of questions to be asked the lecturer. The six topics considered, with their subdivisions, were:

1. City track construction, namely, track, paving catch basins, general, track oil, tools.
2. Drainage, including open and backfilled track, ditching, culverts and catch basins, also tie renewals and joint repairs.
3. Special work and derailment, including derailments and switches, their causes and means for prevention, inspection of switches, inspection of mates, inspection of frogs, inspection of curves.
4. Bonding, welding and grinding and the care of machines for doing this work.
5. Reports and accounting, including authorization, handling of material, status reports, completed reports, records of employees, contracts.
6. Accident prevention and statistics, including injuries from tools, careless handling of ties, injuries caused from grinding and welding, handling rail and looking out for passing automobiles.

These six talks were given respectively by H. C. Packard, R. M. Hyde and R. A. D'Arcy, division engineers; R. C. Waring, return circuit engineer; C. J. Mahoney, chief clerk, and P. F. Joyce, chief adjuster.

OPEN AND BACKFILLED TRACK

1. Drainage is one of the most important parts of track construction.
2. In overhauling track raise it to at least level with the macadam shoulder
3. Do not full backfill low tee rail track except where it is absolutely necessary. This holds the water and if the ballast is not good your track is bound to work
4. Full open track is what we most desire. Water drains quickly, leaving the ties dry and the roadbed in good shape.
5. Half-open track is the next best type. Leave 1½" or 2" opening under the ditch side rail for the water to pass off, and do not allow this opening to get filled up.
6. Only in the more thickly settled districts is track to be full backfilled. Here you depend on high track, good ballast, and ditches for drainage
7. Broken stone ballast is standard for paved track. Some divisions have laid sub-drains under the ballast in some streets.

DITCHING.

8. Your ditch is supposed to not only drain your track but also your ballast. Get it deep enough to accomplish this.
9. Keep the top shoulder of the ditch at least 6" beyond the end of the tie and a greater distance on grades, otherwise you cannot hold your track to line or grade.
10. Do not make your ditches carry water too long a distance.
11. Cut away the bank on the side if the land beyond is low, and the bank not too wide, otherwise make openings through it.

CULVERTS AND CATCH BASINS.

12. Corrugated iron pipe should be installed under all driveways, and extended far enough so that a person will not have to drive too close to the end.
13. Head up the ends with paving stones to prevent crumpling of the pipe, and to hold back the earth
14. Catch basins and pipe culverts should be cleaned out at least twice a year, and in some cases much oftener.

TIE RENEWALS.

15. Use chestnut ties for renewals under paved or unpaved track, but with tie-plates at the joints only on unpaved track.
16. Avoid making holes in ties with picks or bars. It lets the water in and starts rot.
17. More attention should be given to spiking. Driving the spike in at an angle and then pulling it over with the last blow or two, not only reduces the holding power, but also leaves an opening for the water to get in.

JOINT REPAIRS.

18. Track should be inspected at frequent intervals by the section foreman.
19. Do not let your repairs go for too long a time. What may be a small job to-day, may develope into being an expensive one in a very short while. This is especially true in permanently paved track or on special work.
20. We have standardized on the welded joint, and your repairs should be made with this in view. Before applying the plates, the plates and rail should be thoroughly cleaned of rust, the rail ends surface bent or cut back, or both if necessary, and the joint seam welded at the first opportunity

SPECIAL WORK AND DERAILMENTS

DERAILMENTS AND SPLIT SWITCHES.

(*a*) **Causes:—**

1. Defective track, bad joints, line, surface, gauge not enough elevation on curves. No guards or improperly placed guards; poor drainage.
2. Defective switches. Worn and loose switch tongues, no springs, broken bolts or springs, dirty boxes, false flanges on mates, battered frogs, bad line, surface and gauge.
   (All above due to insufficient inspection and maintenance)
3. Obstructions in track and special work.
4. Not enough track greasing.
5. Excessive speed and other improper operation.
6. Defective equipment.
   There is a reason for every derailment and most of them can be and must be prevented.

b) **Prevention:—**

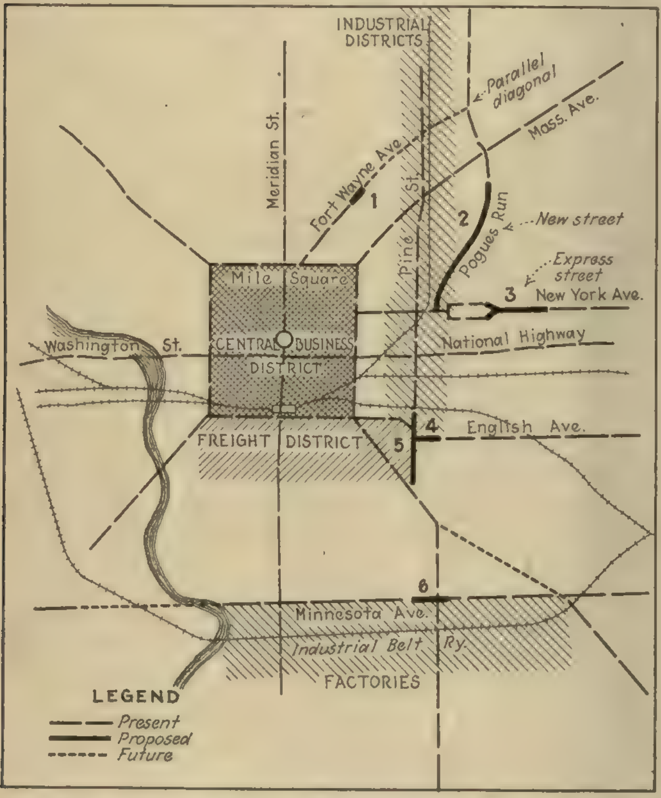
1. Track must be inspected at frequent and regular intervals and defects reported and immediately repaired.
2. All special work must be thoroughly inspected at frequent and regular intervals, defects repaired at once.
   Special work with frequent service every day
   Special work with less frequent service twice a week.
   Special work on country lines once a week.
3. Inspection and repair work must be more thorough than in the past.
   All special work must be under care of some competent man and he will be held responsible for their condition.
   Don't give too many switches to one man.
4. Report to your superior officers all cases where cars run too fast.
5. Keep track groove and special work clean and well greased.
6. All cases of derailments and splits must be thoroughly investigated and where causes doubtful, refer it to Engineering Dept. at once.
7. Discipline given to man at fault.

The Syllabus for the Track Class Is Printed in This Form

Traffic Improvements Proposed for Indianapolis

Engineer's Report Indicates that Efficient Thoroughfare Plan Is First Step in Securing Congestion Relief — Numerous Thoroughfares to Be Opened Up by Construction of Short Connecting Links

SEVERAL immediate improvements that, while comparatively minor in themselves, open the way for much more extensive improvements are recommended in the report of J. Rowland Bibbins, consulting transportation engineer to the Indianapolis City Plan Commission, a preliminary release of which has recently been given. The comprehensive traffic and planning survey made by the engineer with the cooperation of the local forces and the railways company last fall resulted in the discovery of widespread possibilities for fundamental improvements in the city plan, particularly with respect to the system of thoroughfares. These improvements have been laid out for development in the order best calculated to afford immediate as well as future relief.



Six Street Opening Projects Recommended for Immediate Adoption in Indianapolis

In the survey, by means of a carefully laid out schedule the entire traffic movement of the central district was determined as the first and most important step, covering each street throughout the entire day, and for all classes of traffic. The second step covered the examination of some 100 main thoroughfares and their redesign for accommodating and redistributing present and future traffic on practicable standards, with a schedule for reconditioning these streets so as to encourage this redistribution so essential to the relief of the central district. In fact, the volume and complexity of this downtown traffic was found to be so serious a problem that correction of outside defects was clearly needed first to effect any permanent improvement of appreciable value.

Following this a proper traffic control system will be in order, some simplification of car routing in the terminal district, a better system of cartage control of industrial freight and the best plan of railroad development and transit service for the entire district which, under the present city planning law reaches out 5 miles beyond the present city boundaries.

The City Planning Commission has selected six specific improvements for immediate action, all of them recommended in Mr. Bibbins' report. All of these are calculated to perform the function of drawing unnecessary traffic out of the congested district, and especially to create new trucking routes around the center. Another idea is to begin the development of express streets for fast automobile movement entirely clear of the transit streets needed for street car service.

Following are the six projects recommended for immedate action:

(1) The opening of a section on Fort Wayne Avenue. This starts the development of a parallel diagonal street for the relief of the overloaded main diagonal to the center, which virtually will become a new outlet to the rapidly developing northeast section of the city. The street was planned 100 years ago, but was lost through improper land subdivisions.

(2) The Pogues Run extension utilizes an old drainage ditch for a new "get-away" street and to relieve the most congested traffic throat in the city. A direct heavy traffic route will be provided between freight districts, and transit lines along business streets will be cleared of the offending bulk traffic. This ditch is at present an eyesore, but now will be converted into a useful thoroughfare similar to the Fallsway in Baltimore.

(3) The opening of New York Avenue as an express street provides an entirely new type of street for high-speed express traffic, leading directly out of the central district and paralleling the main east-west transit artery to the eastern suburbs. It is designed as a "stop" or restricted speedway. Four other such streets have been laid out in other directions.

(4) The English Avenue project opens an important thoroughfare on the opposite side of Washington Street, the main east-west artery and the National highway. This project is planned to encourage more uniform development of this section of the city and provide a more direct transit entrance. A poorly-laid out subdivision of former days now forces a very crooked and slow entrance.

(5) The improvement of Pine Street gives a new north-south extension through this same area to develop a much-needed trucking route around the central district between railroad and industrial districts located east and south of it.

(6) A short improvement on Minnesota Avenue opens an east-west thoroughfare parallel to the belt line for general crosstown traffic and to encourage industrial trucking to stay in the factory areas until it reaches the most direct route to the freight stations. This route also ties into an important boulevard for expediting faster automobile traffic.

All of these improvements can be developed at relatively little cost and delay. Their importance lies in the fact that they are the bottle-necks of what should be major streets. Moreover, they all have an important relation to the larger city plan which it is the function of the commission to develop. Undoubtedly many other improvements will be undertaken as the theory of these key projects becomes understood by the people. Within the year it is expected that a complete thoroughfare plan will be decided upon for official adoption by the city council, as provided for in the present ordinances.

The beneficial nature of these steps to the basic transit operation throughout the city will be apparent. The traffic survey showed clearly a very large amount of crosstown movement and extraordinary commercial vehicle traffic within the central business district, much of it, without a doubt, due to the defective street system outside. In fact, these conditions were so apparent to the engineer that all efforts were concentrated first outside rather than to attempt now radical measures of relief at the center which would afford no fundamental cure. The seriousness of the problem in Indianapolis is indicated by the fact that there is during the business day no less than one vehicle movement for every 2.5 people of the city, and all of this is concentrated within an area one-half mile from the center.

Some of these general phases of the traffic control problem were discussed by Mr. Bibbins in ELECTRIC RAILWAY JOURNAL for Feb. 23 and March 1, 1924, showing the great value to the industry of adequate fact-data prior to experimental efforts to correct conditions and emphasizing the very important relation of the center to the environs of a large city.

Teaching Firemen About a Subway Car

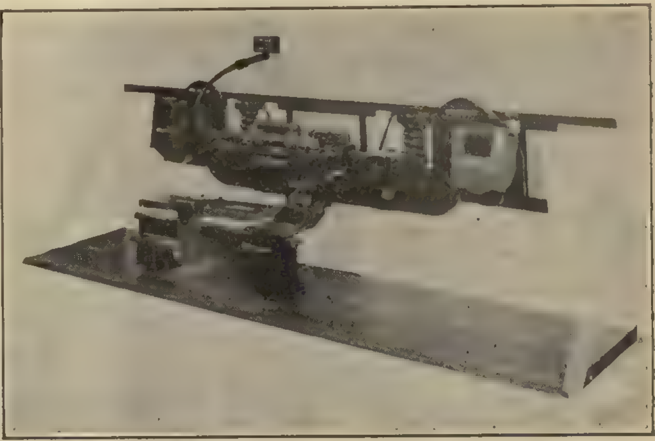
New York Fire Department Gives Instruction at Its Fire College on What to Do at a Subway Fire—Model of Third Rail Construction Used

THE latest addition to the fire college conducted by the New York Fire Department at 153 West 68th Street, New York, is a full-sized model of an electric railway truck side frame, shoe support, collecting shoe and section of third rail, as employed by the Interborough Rapid Transit Company. This model is used to teach firemen what to do in the case of a fire in the subway. The model is of wood and full size. It was built up at the shops of the Interborough Rapid Transit Company in New York and presented to the Fire Department.

Since this model was installed in the fire college, during the first part of May, instruction has been given by a representative of the maintenance department of the Interborough company. Besides this model he uses a blueprint to show the path which the current takes before it reaches the motors and the ground. The point is made that each section of third rail is fed by a separate feeder cable from the substation and is protected by a circuit breaker, that the opening of this breaker automatically cuts the current from the third rail, and that this breaker can be automatically opened at any one of the emergency pull boxes, located on the subway at intervals of about 400 ft. The position of these boxes is indicated by a blue light.

The point is also made that the third rail is protected by an insulated wooden protection board, on which a person can stand with safety; that the contact shoes are of cast iron and can easily be broken with a blow from a hammer, and that all heavy current carrying cables and the motor controlling apparatus are located beneath the floor of the car. The various possible combinations which can form trouble in the subway are also described, and the firemen are taught that about the only occurrence that can cause a flash or smoke in the cars is a short circuit between the third rail and the truck frame. This might possibly start the wooden shoe beams burning or smoldering, or a grounded motor might set fire to the installation of the motor. This can easily be taken care of without inconvenience to passengers, if the routine given below is followed:

1. Pull out the jumpers from both ends of the car that is in trouble.
2. Pull the handle in the emergency box, which cuts power off the third rail. The fact that the power is off is shown by the extinguishing of the main car lights and the lighting of the emergency battery lamps.
3. Get the emergency tools from the emergency tool box and break off the shoes on the third rail side.


Model Used for Instructing Firemen About Third Rail Construction

4. Break off the shoes on the other side of the car where there is no third rail.
5. If there is any flame, extinguish it.
6. Call up the trainmaster's office and order power on the third rail again.
7. Proceed with the train to terminal.

If the short circuit or burning occurs within the motor itself, the firemen are told that it is sufficient to open the main switch.

Shifting from Side to Center Poles in Havana

A CONDITION where side poles were given up for the use of center poles, as described in a recent issue of this paper in connection with Cleveland, developed last year also in Havana. There the double track is in private right-of-way along the center of the street and is not paved except at crossings.

In the reconstruction of the line, the approved plan called for center poles. This required the tracks to be moved about 2 ft. farther apart, but there was not room to do that within the reservation so long as the existing span poles remained on each side. The plan finally decided upon was to build a new track complete in the old position. When this was completed, the track was shifted out 2 ft. from the middle in short sections, without breaking the connections. At the same time that this was done, the center poles were erected and the side poles removed.

The Readers' Forum

Does Not Believe in College Men for Railway Work

SELMA, ALA., June 25, 1924.

To the Editors:

Your article "Using a Technical Man for Technical Work" calls to my mind an attempt made in the same direction on a property I was connected with some time ago. To begin with, the writer did not finish college, but saw enough of the studies used in the electrical course to convince him that a new course was necessary to cover the electric railway field. It is a hard thing to take a man who has studied electrical engineering and put him in the average car shop, working in grease up to his neck, and make him believe he is practicing his chosen work. For it seems as though the grease around a car shop, is the stickiest and hardest to get off your hands.

Another thing to be considered is that the large electrical manufacturing companies have offered the graduating classes good openings before graduation so that you will not get the very best material unless you speak early. Why not teach your own boys in your own shop and then you will have what you want made to order? The average school teaches a lot of useless information calling it electricity, material that is of no use to a young man entering the electric railway business. Why not train your own future heads of departments and teach them the real essentials?

As I said at the beginning, I saw the plan you outlined tried on an average-sized road for two years with little success. It was finally abandoned, owing to the inability of the company to get the young college graduates to take any but a passing interest in the equipment on a street car. They were curious about motors until they saw the inside of one. After that they knew all about it as it had been explained to them by their professor. It was thought early in the experiment that they might be made to do some useful work about the shop, but that idea was soon abandoned, as they came out of the shop at the end of the week with unsoiled overalls and unsullied hands. After two years' trial the management gave up in despair, having in that time tried about eight of these boys in vain. Of the eight young men tried out in this experiment there is only one today whose work is even remotely connected with electricity.

Four other boys used in the same experiment have made a success in the street railway business. All were paid the same wages, worked the same hours and for the same foreman, so it looks as though the college viewpoint had some bearing on the outcome. I think the solution lies in this direction. Let it be known to the men all over the system that you want several boys to learn the electrical and mechanical end of the business. Then instruct your electrical engineer to devote one or two hours a day to them, or have one of his assistants to do so, until they are well versed in the electrical end of the business. Next turn them over to your mechanical department for similar instruction and periodically hold an examination to see if they are learning anything. If not, or if you find any undesirables in the class, weed them out, so that by the time you have taught them for about one year they should begin to return something on your investment.

In two years you should have enough experienced help to fill all the places in your organization, and if you find one or two exceptionally bright boys in a class of average size, then why not give them a real chance and send them to college at your own expense? In other words try the home product in boys before importing any.

W. E. NEES,
Superintendent Selma Electric Railway.

How Speed Affects Wear on Overhead

LEAGUE CITY, TEX., June 19, 1924.

To the Editors:

In a communication I sent you several months ago it will be remembered that attention was called to the fact that while the wear at high speeds was very little, it was excessive at very slow speeds, making it necessary to renew the trolley wire frequently at regular stopping places and to take extra precautions as to anchoring trolley wire to hold it in the event of breaks.

Since sending that communication close observation has been made of wear from sliding contacts on our line, showing that the former conclusions were correct in every detail. It has been demonstrated that with an hourly service each way, with the usual number of extra and special trains, new trolley wire will last not more than two years at the points mentioned.

Accompanying are two sketches showing graphically the excessive wear I have mentioned. This wire had been in use less than two years, the sketches being exact size of two samples cut from the wire at renewal. The piece represented by Fig. 1 was cut from the wire just 65 ft. from that of Fig. 2, which was cut from point of greatest wear. This shows clearly how the wear on the wire rapidly diminishes as the car accelerates in speed. This is representative of what we have at every place where our trains stop or reduce speed very low.

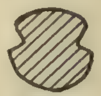


FIG. 1

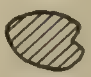


FIG. 2

It has been contended by some that the excessive deterioration is due to the increased current draft from the wire, but the fact that no such condition was encountered during several years of trolley wheel operation clearly refutes that contention, and indicates that the increased wear is almost entirely due to the increased friction at low speed.

This is not to be construed as being in condemnation of the sliding current collector, but only to call attention to a condition that will surely be met with in practice where it is used. For high-speed service it is probable that it is better to use the sliding shoe than the wheel, even though we may have the condition noted, but it is well to anchor thoroughly the trolley wire on each side of such places, as well as on each side of splicing sleeves, section insulators, frogs, etc., as the shoe collector undoubtedly is more severe on such fittings than the wheel. But it stays on the wire better with less wear at other points, if the shoe is not allowed to become badly worn. For slow-speed city service, where stops are frequent, it would seem that the wheel has a decided advantage.

C. L. GREER.

Association News & Discussions

Getting in Better Standing Before the Public

Publicity and Means for Improving Public Relations Are Discussed by Iowa Association in a Joint Convention with the Iowa Section, N. E. L. A.

DEVOTING Thursday, June 26, to the consideration of railway subjects, the joint meeting of Iowa utility men was turned over to F. C. Chambers, president Des Moines City Railway. After telling why he thought the bus would not be able to supplant the electric railway in urban centers, Mr. Chambers discussed public relations. An abstract of this paper appears elsewhere.

Humanized publicity was the subject of a talk by E. P. Harrison, president Iowa Press Association. Securing satisfactory relations with the public was held to be a problem not peculiar to the electric railways and other utilities, but an important factor in the conduct of all business. Successful use of publicity mediums for stimulating favorable public consideration was declared to be a subject requiring careful and intelligent study and direction. Haphazard methods were considered foredoomed to failure.

The public is not interested in dry statistics, according to Mr. Harrison, and will not read them; nor is it interested in the problems of the utilities companies. But once it is inspired with confidence in the utility management, it will act and act quickly for the relief of unfair conditions. The first essential in winning public confidence, is good and faithful service, and without good service to build on, no amount of publicity can be expected to inspire this all-important confidence which is so essential to the establishment of satisfactory public relations.

With these requirements fulfilled, Mr. Harrison held that the task of establishing and maintaining satisfactory public relations is only started. The public is likely to take it all for granted unless attention is intelligently called to the fact. Hit or miss advertising was considered a bar to success. Entire dependence on free publicity through the medium of reading notices furnished to the newspapers was advised against, as it tends to inspire a feeling of resentment and does not help the utility cause in the long run. He advocated telling the story in an interesting and human way and pointed out the importance of using copy written in the language of the people. He also warned the utilities against an attempt to use advertising space only when they need something, without previously building up public good will through this medium by a consistent policy started before the hour of need.

Dwight N. Lewis, member of the Board of Railway Commissioners of Iowa, addressed the convention briefly and suggested a humanized contact between utilities and the communities which they serve, as being an essential to building that mutual co-operation which is so important to good service and satisfactory relations. Above all else, he urged fair dealing in all the relations in which the utility enters.

HOW TRACK RECONSTRUCTION ON ACCOUNT OF PAVING CAN BE AVOIDED

At a luncheon session it was pointed out that a study of the conditions existing in certain cities revealed that the railway in some cases is required to rebuild its track completely on account of repaving regardless of the condition of the old rail.

President Chambers showed that it was possible, in at least one case in Des Moines, to require property owners who petition for an extension of a line into new territory, to sign a contract not to pave the street within a specified number of years, or else to bear the cost of the paving themselves. Although such a contract becomes a lien on the property, Mr. Chambers explained that the potential obligation to pave any street is in very much the same class, even if no car line is put in, and that this point of view can be made the basis of overcoming objection to such contracts as conditions to the extension of car lines in cities. It was also the opinion of some of the members present, that legislation relieving the railways of the paving burden, could be so drawn that the roads would not at the same time be required to rebuild track completely whenever a street is paved or re-paved.

On the recommendation of the nominating committee, the officers and directors who served the association during the past year, were re-elected. These included: President, F. C. Chambers, president and general manager Des Moines City Railway; vice-president, R. A. Leussler, general manager Omaha & Council Bluffs Street Railway; secretary and treasurer, H. E. Weeks, vice-president and treasurer Tri-City Railway & Light Company, Davenport. F. J. Hanlon, president and general manager Mason City & Clear Lake Railroad, was re-elected a member of the board of directors, and W. J. Bertke, vice-president and general manager Sioux City Service Company, was elected to the place made vacant by the retirement of C. D. Cass.

On Wednesday night the members and friends of the two associations staged an unusually lively banquet, which was conspicuous by the absence of speeches. The evening was concluded by an informal dance. Golf for the men and a series of entertainment features for the ladies arranged by Mrs. Sterns and Mrs. Burnquist, furnished diversion during the afternoons and evenings of the other days of the convention.

Five Ways to Improve Public Relations*

BY F. C. CHAMBERS

President and General Manager Des Moines City Railway

THE most essential thing in the successful operation of a street railway property is good public relations. The question then immediately arises, how can good public relations be secured and maintained. Primarily, the function of the electric railway is to furnish ample transportation for the community which it serves. In order to give this service we must not only have the facilities, but a great deal of thought and attention must be given to provide adequate service at the time of day when it is required. A careful study of traffic movements must be made frequently, and schedules adjusted so that the correct distribution of cars on the different lines is secured. After the survey has been made and schedules worked out, careful supervision must be given to the operation of cars in order to secure the headways which are called for by the schedules. There is no one thing which will create more dissatisfaction and discontent or cause more complaint than irregularity of headways. Of course, with the congestion in the business districts of our cities and the fact that many of the lines may cross steam railroads where they are frequently held up for several minutes at a time, it is very difficult to keep the cars spaced in accordance with the schedules, but in many cases a careful investigation of the matter will enable routes to be changed and alterations made in operating conditions which will eliminate, to a considerable extent, these delays.

Once the service is established, it must not be assumed that no further attention is necessary to maintain it. If it is found that irregularities in headways continue to occur, a careful investigation should be made to determine whether or not it is the fault of the men operating the cars or whether it is due to the fact that the running time has not been given due consideration in making out the schedules.

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*Abstract of a paper presented at the joint meeting of the Iowa Electric Railway Association and the Iowa Section, N. E. L. A., Fort Dodge, Iowa, June 26.

Very few of the patrons of a railway system have the slightest idea of what is involved in the operation and maintenance of a system operating a comparatively large number of cars, or the investment and operating expenses involved in giving this service. Even when adequate and efficient service is being given, there will be more or less complaints received. Some of these are justified; many are imaginary. Regardless of the nature of the complaint, the company should maintain a department which will take care of and investigate all complaints. If the complaint cannot be taken care of satisfactorily by correspondence, a personal call should be made explaining the situation in detail and at all times taking the attitude that the company stands ready and willing to rectify any injustice done to its patrons.

It must be remembered that the men on the cars are the salesmen for the company and every effort possible should be used to educate these men to give courteous treatment to the company's patrons. In many instances, where these employees are dominated by a labor organization, it is difficult indeed to secure their co-operation along this line, but a great deal can be accomplished in securing this co-operation by creating activities among the employees, which will have a tendency to bring the employee and employer closer together and perhaps to educate the employee in the problems with which the company is confronted.

One of the most prolific sources of discontent and dissatisfaction on the part of the public lies in the fact that it does not know the problems which confront the company. The passenger has no conception of what becomes of his fare. If it is left to some demagogue or perhaps some one who is antagonistic toward the company to disseminate this information, nine chances out of ten the information given will be far from correct and prove detrimental to the company.

From time to time it will be found beneficial to advise the public pertaining to the revenues of the company, its operating expenses, and similar information. In this way the public will become acquainted with the operation of the property, and the disposition made of the money which it is paying to support the corporation.

In the past a great many operators have taken the position that the public is not concerned as to the disposition of the company's revenues, but the experience which the companies have had during the past few years has demonstrated that this is the wrong stand for a company serving the public to take. It is a characteristic of the great American people to want to become acquainted with those with whom they do business. Of course, it is very difficult indeed, if not impossible, for the manager of a street railway to know personally any considerable percentage of its patrons, but it is possible to have the heads of the different departments which are responsible for the operation of the system become acquainted in different ways with a large number of people in the community by having them join civic organizations such as the Rotary Club, Kiwanis Club or Lions Club, not forgetting the fact that a substantial membership in the local Chamber of Commerce will unquestionably prove very beneficial.

Motor Bus as an Auxiliary in Baltimore*

By L. H. PALMER
General Manager United Railways & Electric Company, Baltimore, Md.

IN 1915 Baltimore, like many other places, was over-run to a considerable extent with jitneys of the Ford type. A bus body was developed locally, known as the "Baltimore" type, which seated four persons each on two longitudinal seats behind the driver and two additional on the driver's seat. These were crude affairs with a tarpaulin top and sides and open step at rear. I remember one of these machines that went down the street with 23 people clinging to it!

Subsequently a few of the operators invested in larger chassis, but of the 100-odd machines that were in operation at the peak of the mania probably 98 per cent were Fords, with bodies similar to that described.

In 1916 our company, in order to determine the possibilities of the motor bus, and also to combat the indiscriminate competition which was affecting our income, went into the motor bus business. We incorporated two companies—one operated the Ford jitney of the "Baltimore" type, and entered into direct competition with these machines over the three most largely operated routes. The other company bought buses of a better type, equipped with cross seats, and put these on Charles Street in direct competition with a company that had started up to give a better type of service on that high-class thoroughfare.

The operation of the Ford type of jitney began to wane, and after an experience of 15 months we took off our jitneys of this type.

Later, through an amendment to the Public Service Commission law, the power of regulating motor buses and jitneys was vested in the commission, and it became necessary to obtain a certificate of convenience and necessity from it before any new operations could be started. The law provided that any buses in operation at the time this amendment took effect were to be considered *prima facie* to have demonstrated "convenience and necessity." As a result, there is one route with some 30 buses running east from the heart of the city that operates in direct competition with our street cars at about an equal rate of fare. This line of jitneys is now operating 25-seat buses in modern type.

TRANSPORTATION MONOPOLY IS BEST

As a result of the experience gained, we are firmly of the opinion that all transportation service in a community should be furnished by one company. We believe that the street railway company is at least as capable (and we think more capable) of furnishing proper transportation facilities as any other agency. It certainly has the experience and organization. If you will pardon a personal opinion, I think the one thing that frequently is lacking to complete the combination is a proper attitude of mind on the part of the directing heads of the company. Our own feeling is that if by any stretch of imagination the airplane becomes a common carrier for urbanites, then we want to operate them in the city of Baltimore along with street cars, buses, rapid transit facilities and trackless trolleys!

Our motor buses are operated by a subsidiary entirely owned and controlled by the United Railways & Electric Company. The company is known as the Baltimore Transit Company and operates six routes at the present time. The two main routes are entirely independent of the street cars, charge a 10-cent fare, furnish seats and issue no transfers. The most important one operates on Charles Street, from the financial and shopping districts to and through a high-class residential section on the north side of the city.

Since 1916 the service rendered on Charles Street has gradually extended until at present we are operating 16 to 20 buses on this route, which has a round trip length of 6.5 miles. Four of the buses are of the double-deck type and the balance are 25-seat single deck. We are using the low-level 51-seat double-deck buses manufactured by the Fifth Avenue Coach Company, New York, and have just purchased four more, which will be delivered within the next month. One of these will be equipped with tarpaulin rolled top and side windows, the latter dropping into pockets. This is experimental, to determine its availability for protection of passengers in inclement weather and also on days when a hot sun beats down.

The other route, the Mount Royal Avenue line, diverges from Charles Street about a mile from the business center and taps another residential section, reaching the edge of our largest park.

The first of these routes, under the present fare, is showing a moderate profit; the other route is not yet paying its way. This second route was installed about two years ago, because the Public Service Commission had a bona fide offer from responsible parties to put bus service on this route, and told us that if we did not furnish the service, it would give the other people an opportunity to do so. From our study we felt that the route would not be profitable under the conditions, but decided we should undertake it and do our best to build it up to a point where it would not be a drain. We are hopeful that this result may eventually be obtained.

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*Abstract of a paper presented at the meeting of the New York Electric Railway Association, Long Beach, L. I., June 21, 1924.

In addition to these two main operations, the Baltimore Transit Company is operating two routes of about 1 mile each as direct feeders to the street railway system. These were both put on in lieu of building car tracks and the rate of fare is the same as the street car; that is, 8 cents cash or 7½ cents when metal tokens are purchased, with interchange of transfers to and from intersecting lines. Neither of these is paying its way.

On Monday of this week we put on another route—about 3 miles long—in the eastern section of the city, to afford direct communication between a residential section and a manufacture district which heretofore had no direct connections, passengers being obliged to go around three sides of a rectangle in order to get from one to the other. It is too early yet to say what this now route will do. It was established by order of the Public Service Commission as one of the requirements of getting an increased fare, and preliminary studies do not look hopeful as to its operating at a profit.

EXPERIENCED WITH THE TRACKLESS TROLLEY

The sixth route operated by the transit company is a trackless trolley. In this case owners of real estate along the line insisted that the Public Service Commission help them to obtain some kind of transportation service. Our studies indicated no possibility of the route paying for a number of years, but the commission felt it was a desirable development for the good of the city and its environs, and finally, after negotiations between the commission, the citizens and ourselves, we agreed to install the trackless trolley. Originally our own recommendation was that motor buses should be operated, as we knew more about their possibilities, but the real estate owners wanted something more definite and tangible as an evidence of continued operation to enable them to sell lots, and they felt that if they could not get steel rails laid in the ground, the next best thing would be a network of wires overhead, and for this reason the trackless trolley, which type of service had been recently inaugurated on Staten Island, was determined upon. The people interested raised $32,500 and deposited it in a bank to be used to reimburse us for deficits on the basis of $10,000 the first year, $7,500 the second and $5,000 each for the next three. Results have shown continued deficits more than twice the above guarantees to date. Our primary mistake was in giving too fast service over a mediocre road and that has made our maintenance costs high. We have included depreciation charges of 20 per cent on equipment, 5 per cent on overhead. These plus the seat-mile tax naturally added to our costs.

One of the primary difficulties with the trackless trolley has been the lack of engineering study and experimentation looking toward the development of an economical type of vehicle.

Trackless trolleys so far developed weigh from 25 to 35 per cent more per seat than do the gasoline buses. On the basis that the power plant weighs about the same, it would seem that there is need for considerable additional engineering development to get the weight of the trackless trolley down at least to that of the motor bus before it can be considered successful.

I mentioned the fact that the real estate developers felt that a bus line would not enable them to sell their land. In another section of Baltimore a tract of high grade land of about 500 acres has been sold to the Roland Park Company for development in better type of homes. Members of this highly trained organization, when they came to us to discuss transportation service to this tract, did not want a bus line. They said they could not sell their property as effectively without steel rails laid in the ground.

At the present time there is a committee working to define a policy for extension of our service with either car or bus to outlying districts within the city limits. A representative of the commission, of the Real Estate Board, the city, the Topographical Survey and our company composes the committee, and they are endeavoring to work out a practical plan as to how transportation service can be furnished without being an undue burden on the street railway company, which means, of course, upon the citizens of the community, because our costs, of necessity, have to be borne by the people who ride on the cars.

The organization of our bus business follows very closely that of the street railway. We have a superintendent in general charge who reports to the general manager. The shop foreman, inspectors, dispatchers, etc., report to him. The same general type of supervision, of discipline, of instruction, of schedules, runs, headways and layovers is followed along the well tried out process of the street railway system. The shop foremen, however, do not report to the equipment department of the street railway and the mechanics and laborers working under them are recruited from men who have had experience in automobile repair and operation. Chassis are taken care of at our main garage and minor repairs made, while the painting and body overhauling work are done at the street railway shops on a cost basis, with a proper proportion for labor and supervision added. The care and maintenance of all our automobile trucks, touring cars and emergency wagons are also under the superintendent of automotive equipment.

In addition to the main garage where the buses are all housed and most of the touring cars, we have another garage, about 2 miles distant, which houses the service trucks of the maintenance of way and power departments. A system of regular inspection days for all equipment has been worked out and this has been found of value in reducing costs by preventing a car running too long without proper inspection and repairs. A sub-storeroom is located at the main garage and parts for automotive vehicles are kept at that location.

The safety work and the handling of accidents and damages are taken care of by the railway and wherever possible its organization is used to handle business of the Transit Company, as, for example, our purchasing agent. The handling of the receipts is attended to by the dispatcher, who is under the supervision of our cashier and treasurer. The same applies to payrolls and other operating details.

One of the points on which we are laying great stress is the matter of good housekeeping and attractive appearance of our motor buses. We believe it essential to keep up a high standard; that our employees must not only be efficient operators, and courteous to the public, but must present a cleanly appearance.

We compiled some statistics recently to show the relative measure of service on basis of population served per mile of track in Baltimore and several typical English cities. I am going to quote this as a matter of information, which seems to me to show why there is more opportunity for bus development in some of the communities in Great Britain than in this country.

City	Population	Miles of Track	Population per Mile Track
Baltimore.....	800,000	415	1,937
Glasgow.......	1,300,000	198	6,565
Birmingham...	900,000	130	6,923
Liverpool......	800,000	128	6,250
Edinburgh.....	500,000	100	5,000
Sheffield.......	500,000	79	6,330

These figures are extremely interesting to my mind as showing how much greater service is rendered the community by the street railways in this country than is done by the cities in England, and to an extent indicates that there is less need of bus operation here than abroad.

What possibility exists for so-called de luxe service between centers of population is a matter that has not been fully settled. There is unquestionably a considerable field for this type of transit, and climatic and road conditions and the habits of the people are all important factors. In the State of California, or in Florida, where the weather is warm, where people go for recreation and pleasure, where there are good roads, and, in the case of California at least, wonderful scenery, there is no question but that such operations are very popular; but these factors have much less potency, it seems to me, in a state like New York. Just where they fit in the transportation scheme in a large city is a matter about which we are undecided. We have some dreams about the use of this type of service, but have taken no definite steps as yet in that direction.

The statement has been made that 1,200 motor buses were owned and operated by street railways this year as compared with 300 on Jan. 1, 1923, an increase of more than 300 per cent in a single year. These buses are operated by 143 electric railways, 13 of which have replaced their street railway equipment with buses.

There can be no doubt but that the motor bus as a unit in our transportation system has arrived.

Track Construction*

Substructure Generally Lighter than in America with Emphasis Laid on Need of Flexibility—Practice on Paving, Joints and Curves Described

By M. J. Torres y Estrada
Way Engineer Barcelona Tramways

OPINION differs as to the relative desirability of a flexible and rigid substructure for track. The flexible type is usually constructed of broken stone to a depth of 15 to 25 cm. (6 to 10 in.) on which is placed a layer of gravel or sand, 8 to 10 cm. (3 to 4 in.) deep. This substructure is either carried all the way under the track or else only for a width of 40 to 50 cm. (16 to 20 in.) under each line of rail. The concrete base may also extend all the way under the track or be placed only in the form of a stringer under each rail.

Ties are not always used, as with the stringer form of construction the stringers are depended upon to give support to the rail and tie rods to keep the rails to gage. Wooden ties are usually of oak, cedar or pine, sometimes treated and sometimes not. They are spaced from 80 cm. to 1 m. (32 to 40 in.) apart, except under special work where closer spacing is followed.

Barcelona uses a concrete substructure but in most places it is not carried all the way under the track. Usually it is laid in the form of stringers, 40 to 50 cm. (16 to 20 in.) wide and 16 to 25 cm. (6 to 10 in.) deep, under each rail. If a quickly drying job is required, a special cement is used, such as cement fondu, and in this case the track can be used after 24 hours. In Neuchâtel and Lausanne, the concrete stringers used are made up away from the job in 1 m. lengths, and then laid in the trench. This has the advantage of permitting the immediate passage of cars.

Only four companies, among them Geneva, use wood ties in a concrete sub-base. Glasgow followed that plan for a number of years but abandoned it. Copenhagen uses old rails as ties, partially or fully embedded in a concrete base. A few companies mount their rails on wooden stringers, placed on or buried in concrete. The Hague, Turin and Liége follow this practice. The Hague uses Australian wood stringers, the two other cities employing oak. Several companies report the use of asphalt between the base of the rail and the concrete substructure to produce a cushioning effect. Several others use Australian or teak wood for this purpose, and Marseilles is testing out under its special trackwork a layer of lead.

These and other precautions have been installed to avoid the rigidity of the monolithic concrete construction, whose disadvantages may be summed up briefly as follows:

The vibration of the rails, in spite of all precautions, affects the joint between the rail and the concrete. Water seeps in and disintegrates the concrete particularly at the joints. Renewals and replacements to the track structure are expensive and slow, and a wait is required to allow the concrete to set if any considerable part has been renewed. It is difficult to get at the gas, water, and other utility piping under the street.

Most companies drain the groove of the rail, the drains being at the foot of grades and especially before track switches. Such drainage reduces the cost of maintenance and the quantity of water which gets in under the track.

Types of Paving

Macadam—This type of paving is going out of use and is not a particularly desirable one from the railway point of view, as it is apt to be worn by vehicles into ruts next to the rails. To overcome this, stone toothing is often used adjoining the rails, especially around switches, the space between the toothing and the rail being filled with cement, tar or asphalt. The advantage of macadam is its low cost, but in addition to its rapid deterioration, one company claims that the dirt and mud transferred by vehicles to the rails increases rail wear.

Stone Block—This is undoubtedly the paving most generally used. The blocks are sometimes laid directly against the rail, but sometimes there is a filler of sand and gravel or a special paving brick. While there is a tendency for ruts to form alongside the rail, this pavement is undoubtedly considered the best by railway managers, because of its wearing qualities and its ease of maintenance for both paving and track.

Wood Paving—This is supported on a concrete base. Australian wood is considered desirable because it swells less than softer woods, but is expensive. In consequence, other woods, treated, are being used. One line of wood blocks is laid on each side of the rail longitudinal to it, and the others with their main axes at right angles to that of the street. The chief advantage of this paving is its quietness, and it permits repair about as easily as the stone paving. Its drawback is its cost.

Concrete Paving—This is used very little, so no facts are available.

Asphalt—Like wood, this paving has to be laid on a concrete basis. Best results are secured when the asphalt is laid directly against the rail, but a number of companies separate the rail from the asphalt by a row of wooden or stone headers, the latter being preferable

Superstructure

The general weight of rail used is from 20 to 22 kg. per meter up to 36 kg. for T-rails (72 lb. per yard) and to 60 kg. per meter (120 lb. per yard) for grooved rails. Their length varies on straight track from 10 to 20 m. (33 to 66 ft.) and in Paris rails of 24 m. (78 ft.) have been used. In general, the longer the rail, the better for railway purposes, except for the practical limit of ease of handling in the mills, in transportation, and in city streets.

The joint is still the weak point in the track. The bolted form is the most popular, the connection being made with six, eight and even twelve bolts. Patented mechanical joints are employed to some extent, but are not in as general use as they were. The Haarmann duplex rail is still being used in a few places.

Three companies report they are still using the Falk cast-welded joint, the pioneer of the welded joints. The arc weld has not come into very general use yet, though 50 per cent of the companies replying to the data sheet report they are making some use of it. In the opinion of the author, the aluminum-thermit joint is the best, as it is simple, easy to apply and effective. While higher in cost than some, it is cheaper in the end if the joint holds. Sixty-five per cent of the companies replying to the data sheet are using this joint with satisfaction as regards breakage. Lille-Roubaix-Tourcoing has 13 km. (8 miles) of track which were welded by this system in 1906. During this time not more than thirty joints were broken. The system at Mulhouse figures on a basis of 1 per cent breakage for both aluminothermit and arc welding.

Practice favors opposite joints, but varies on whether the joint should be suspended or supported. Tie rods are generally used. Bonds are generally attached to the rail by welding or brazing. The use of ordinary solder for bonds has disappeared.

Practice differs as to the layout of curves, some using the parabolic form throughout and others a circular arc in the middle of the curve with spiral entrances. Several companies, including Marseilles, Paris and Lyons, report the use of manganese rail on curves and that its life is three times that of the ordinary rail. The Hague and Glasgow have used the Sandberg system for rails on curves, though in the latter case no great benefit was observed. Lille-Roubaix treated a 6 m. length of rail by heating the head with the torch and then chilling it with water, and after 26 months of use reports a noticeably reduced wear. Paris has also experimented along these same lines.

Opinion is divided as to whether grease, graphite mixed with water, crude oil, a mixture of oil and graphite, or of tar, oil and graphite, is best for curves. Paris has arrangements for putting water in the groove and finds that it reduces the grinding of wheels on curves.

Only four companies use the underground conduit systems, namely, Paris, Bordeaux, Brussels and Lyons. They report in general that maintenance is high, that the system is more subject to interruption than the trolley and that they would prefer the latter.

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*Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

A.I.E.E. Discusses 1,500-Volt Automatic Substations

In General the Features Do Not Differ Materially from Standard Practice—Full Automatic Operation Not Favored in All Cases

THE use of 1,500-volt automatic substations for supplying direct current to suburban electrified railways was the subject of a paper before the annual convention of the American Institute of Electrical Engineers held at Chicago June 23-27. This paper, which was presented by C. A. Butcher, general engineer Westinghouse Electric & Manufacturing Compay, gave a complete résumé of the subject. His paper discussed the power requirements, location of substations and their capacity.

Regarding the selection of converting equipment, the author stated that synchronous converters have the advantage of smaller space and weight combined with higher over-all efficiency. Motor-generators are more stable under wide fluctuations in voltage and can carry heavier momentary peak loads.

As to the relative merits of shunt and compound field windings, the author emphasizes the need of a drooping voltage characteristic for automatic service, so that the shunt winding is favored. Where compound-wound converters are used this drooping characteristic has been effected by limiting resistors inserted in the circuit automatically on overload.

For 1,500-volt d.c. service the larger units, whether motor-generators or converters, will be made up of two 750-volt machines connected in series. This is especially true of 50- and 60-cycle converters. The general features of the control equipment are essentially of the same type as in low-voltage automatic stations.

Application of automatic control to substations was discussed by several speakers. V. E. Thelin referred to some simplified substations which have been used by the Chicago Surface Lines for three years without any inspection or maintenance. Trouble has been experienced only with one contact finger and a clock. The speaker favored shunt-wound rotaries and no shunts on the circuit breakers.

G. I. Wright announced that the largest automatic substation now contemplated for railroad electrification consists of two 2,000-kw. units. Suburban lines would involve four or five such units. Full automatic operation was not considered advisable by the speaker, although reclosing and automatic starting and stopping switches were considered desirable.

Precaution will have to be taken to prevent lock-out of motor generators and rotary converters on flashovers, especially with third-rail systems, if continuity of service is to be expected from automatic operation, declared A. M. Garrett. Manually operated substations will be employed on the Chicago terminal electrification of the Illinois Central Railroad, but they have been designed so that they can be converted to automatic operation if this becomes desirable in the future.

A. C. Grayson claimed that Newark, N. J., has the largest combined automatic railway and power substation in the country and that it is noise-proof. Fourteen new automatic substations are under construction by the Public Service Electric Company of New Jersey for commercial, railway and combined commercial and railway service. It is expected that reclosing feeder breakers and supervisory control will be installed in the manually operated substations as they are rehabilitated.

Within thirty days the Detroit Edison Company will have 33,000 kw. in automatic substations, 16,000 kw. of which was installed this year, according to J. W. Bishop.

American Association News

Committee Sails July 9

JAMES W. WELSH, Harley A. Johnson and Harry L. Brown, special committee on foreign operation recently appointed for making a study of advance practices among transportation companies in the principal cities in Europe, will sail on July 9 on the *Aquitania*. Their headquarters in London will be at the Hotel Curzon, where they will remain two or three weeks. The remainder of their time abroad will be spent largely in Paris, with some study of electrification work in Switzerland, if time permits.

Exhibit Committee

THE exhibit committee of the American Association met in New York on July 2 for the purpose of assigning space at the Atlantic City convention, Oct. 6-10. Those present were J. C. McQuiston, chairman; C. E. Morgan, vice-chairman; Edward Dana, C. P. Billings, Cornell S. Hawley, L. W. Shugg, A. L. Price, A. M. Robinson, Executive Secretary J. W. Welsh and Director of Exhibits F. C. J. Dell.

Mr. Dell reported to the committee that to date 141 applications for space had been received, totaling 69,965 sq.ft., which compares with 43,864 sq.ft. in 1923 and 26,420 sq.ft. in 1922 at the corresponding date. Mr. McQuiston commented that the director of exhibits was to be congratulated upon the fine work he has done. The problem this year will be that of finding sufficient space rather than to find exhibitors.

A motion was passed approving the work done thus far by the executive secretary and the director of exhibits.

The rate for exhibit space on the track on Mississippi Avenue was set at $2.40 per linear foot. The committee authorized the executive secretary and the director of exhibits to cancel the assignment of space to any exhibitor if not paid for in a reasonable time.

The committee faces a particularly difficult problem this year in view of the fact that the applications for exhibit space by bus manufacturers total about 24,000 sq.ft., while the total available space with sufficient headroom and having adequate floor carrying capacity is only about 23,000 sq.ft. This is a condition which may require the committee to move some exhibitors from spaces they have occupied heretofore, in order to use all suitable space for exhibitors who require high clearances. A special effort is being made to expand the available exhibit space and a special sub-committee was sent to Atlantic City following the meeting to see what arrangements could be worked out. The committee is going to great length trying to please both old and new exhibitors, and where because of the conditions this year old exhibitors have to be moved to new locations, special plans are on foot to make particularly attractive some of the exhibit space that heretofore has been considered as less desirable.

The committee also decided to recommend to the entertainment committee that the orchestra music on the pier mornings and afternoons be not arranged for this year, as it is considered distracting to the exhibitors.

Sub-committees were appointed as follows:

Membership: New York district, C. E. Morgan and E. P. Waller; Pittsburgh district, J. C. McQuiston and C. P. Billings; Cleveland, Detroit and Toledo district, J. H. Alexander; New England district, Edward Dana; Chicago, E. J. Blair and L. E. Gould; Mid-West, A. L. Price; Southern, E. B. Meissner and B. W. Frauenthal.

Decorations: L. W. Shugg, A. M. Robinson and F. C. J. Dell.

Space, power, car and bus exhibits: E. J. Blair, A. M. Robinson, E. P. Meissner and L. E. Gould.

Meeting rooms and Insurance: J. W. Welsh and F. C. J. Dell.

To co-operate with Entertainment Committee: L. W. Shugg and A. M. Robinson.

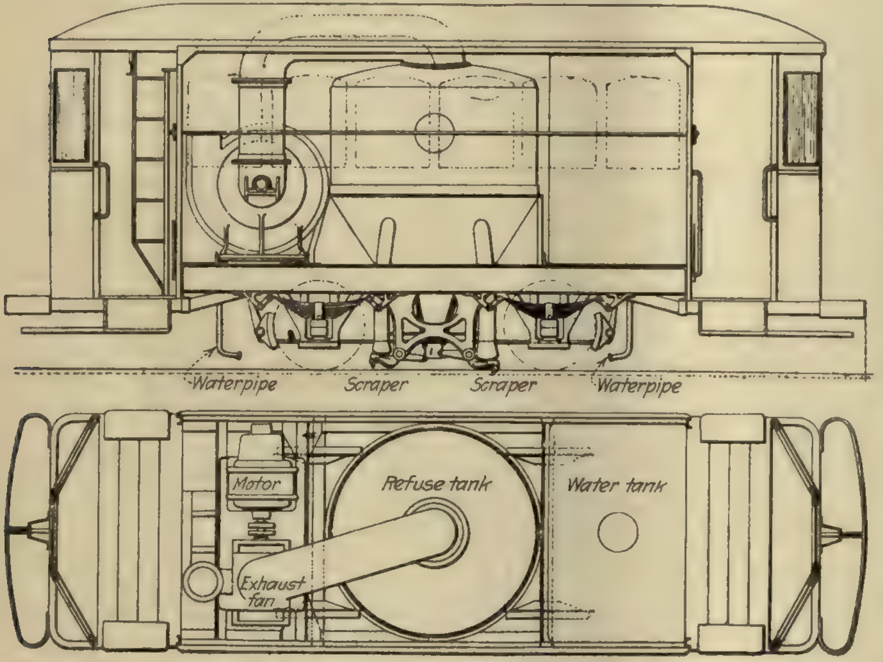
Report on Educational Work Completed

CHAIRMAN EDWARD DANA of the American Association committee on education appointed Myles B. Lambert and H. H. Norris, with himself as chairman, as a sub-committee to draft the report for the Atlantic City convention. This committee met in Boston on June 12 and 13. A number of valuable reports of educational work being done by member companies, which had been prepared for the committee, were digested for use in the report of the committee on education. The sub-committee also approved for immediate publication and distribution in pamphlet form a monograph entitled "Why Educational Work Pays." The sub-committee made an inspection of the educational work being done by the Boston Elevated Railway, particularly the new instructional headquarters at Sullivan Square station.

Maintenance of Equipment

Vacuum Cleaner for Grooved Rails

A CAR equipped to dig out the dirt from the grooves of rails and then pick it up by an exhaust fan on the principle of a vacuum cleaner has been developed in Arnheim, Holland. It is described in an article by P. M. Nieuwenhuis, manager of the Arnheim Tramway System, published in a recent issue of the *Revue Universelle des Transports.* The point is made in the article that when the groove in the rail is kept clean, there is not only less danger of derailment, but there is a considerable economy of power. The author also claims that to dig out and remove the dirt at the same time is much better than to remove it first by hand, then have it shoveled up by another gang, because, during the interval, much of it may be worked back into the groove by passing vehicles. While the groove on the average European rail is usually narrower than on rails in this country, from 1 in. to 1½ in. is the common width, a brief account of the car may be of interest.



Plan and Elevation of Vacuum Cleaner Car

The apparatus used is mounted on an old single truck car, whose sides have been boarded up to prevent the dirt sucked up from sifting out through the windows. The scrapers used are adjustable from either platform and are pressed down by springs, as shown in the elevation of the car. There is a pair of scrapers for each direction of running, the other pair being raised.

The vacuum tubes terminate directly above the scrapers. The vacuum tank has a capacity of about 4 cu.yd., and the exhaust fan is driven by a series-wound motor of about 15 hp. This motor is protected from overload by a circuit breaker on each platform.

In addition to the scrapers and vacuum cleaners, the car carries a water tank with outlets over each rail at each end of the car. These outlets are controlled by valves operated by the motorman, who soon learns how much moisture is required to facilitate the work of cleaning. In wet weather no water is necessary. In dry weather, the dirt comes out better if sprayed. The water tank is furnished with a gage which can be read from the platform.

The dirt tank is fitted with a signal which notifies the motorman when it is full. It then can easily be discharged over a dump. The sides and roof of the car are removable so that it is easy to get at the mechanism. There is also a trapdoor on the side, so that the scrapers can be reached in that way.

On straight track the car can make about 15 m.p.h. Hence it can be used between regular cars without delaying traffic. On curves and over special work operation has to be slower.

A single operator can run the car, and it requires hardly more attention than any other type of car.

Relation of Armature Slot to Commutator

SOME suggestions for laying off the armature core in relation to the commutator, when rewinding armatures, were given in an article in the *Electric Journal* for December, 1923, by M. E. Chapman, of the Westinghouse Electric & Manufacturing Company. The proper layout of the coils can be obtained from the winding itself before stripping an old winding. Manufacturers also furnish proper winding data. Sometimes the layout is marked on the end of the bars by the manufacturers, by means of punch marks. When the position of the winding on the armature is originally determined the relation of the commutator throw to the armature throw is prick punched on the end of the commutator. This shows either the center line of the coil throw or the center line of slot 1, and the commutator throw of the first coil. If the center line of the coil throw or the center line of the slot, come on the center line of a bar, the bar is punched. If the center line of the coil throw or the center line of the slot comes on the center line of the mica then the bars on both sides of the mica are punched. When the commutator throw is laid off each bar which is to receive a lead from the first coil is punched. This is true for both top and bottom leads. The varnish covers the end of the commutator and must be scraped off to find these punch marks. A screwdriver or piece of string can be used in determining the center line of the different parts.

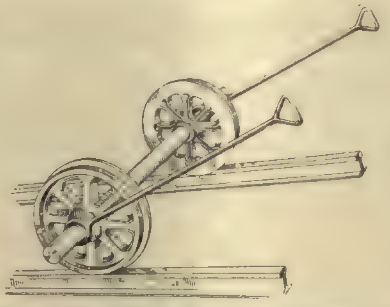
The following rules are given to determine whether there is a dead single coil in the first coil on a four-pole motor:

1. The wave or two-circuit winding always requires an odd number of commutator bars, while the multiple winding may have either an odd or even number.
2. A multiple winding never requires a dead lead.
3. When an even number of coils per slot are used there will always be a dead lead on a two-circuit winding.
4. When an odd number of coils per slot are used, and there are an even number of slots in the armature, there will always be a dead lead on a two-circuit winding.
5. When an odd number of coils per slot are used and there are an odd number of slots in the armature, there will never be a dead lead on a two-circuit winding.

When starting to put the coils in the slots, the bottom part of the first coil should be placed in slot 1, and the top of the coil in the slot that corresponds to the coil throw. When winding coils with both ends closed the top of the throw coils should be placed in the top of the slot, and the coils shaped up. If this is not done the winding will bind. If the coils have open ends, the top of the throw coils need not be put down until finishing the winding, as these coils have only the bottoms shaped and are flexible enough to shape with only the bottom parts in the slots. In shaping the coils they should be hit on the flat part of the diamond only, and care should be taken not to collapse the loops as this will cause short circuits. When lifting the throw coils care should be taken not to injure the insulation on the coils. They should be lifted one at a time starting with the last coil of the first throw and working toward the first coil. In this way the maximum room for putting in the last coil can be obtained.

Handles Used for Rolling Sets of Wheels

IN THE railway repair shop of the Savannah Electric & Power Company, Savannah, Ga., the wheel press is located several hundred feet away from the car storage house. It is often necessary to take out wheels and axles from the trucks under a car in the storage house and move them to the wheel press. A convenient method of doing this is to push the wheels along the track by the use of long steel handles made of steel rods. The rod has a hand grip at one end and at the other end is a loop slightly larger in diameter than the axle. One handle is slipped over each end of the axle, as shown in the accompanying sketch. Pressure downward and forward on the handle causes the truck to roll forward along the rails, and it is thus moved from the carhouse along a connecting track and into the repair shop.



Method Used in Savannah for Rolling Sets of Wheels from Carhouse to Shop

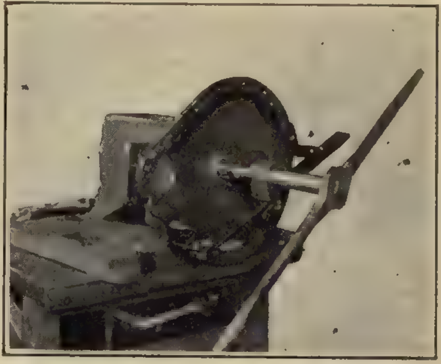
Reaming Compressor Bearings

AIR compressor main bearings are babbitted in the Decatur shops of the Illinois Traction System and after being placed in the housing are reamed to size by means of an expansion reamer. The device used is a line reamer with a micrometer adjustment of the cutting blades. The accompanying illustration shows the reamer, which was manufactured by the Davis Boring Tool Company of St. Louis. These are made especially for the Illinois Traction System in the following sizes: 2⅛ in. to 2 3/16 in., 2 3/16 to 2¼ in. and 3⅛ in. to 3¼ in. Small sizes are for use on the 25-cu.ft. compressors and the larger size is for the 50-cu.ft. compressors. The reamer is approximately 4 ft. long with a body diameter of 1½ in, and has a square shank at one end. The cutting blades are only a little longer than the bearing and are located about 18 in. from one end.

Expansion Reamer with Micrometer Adjustment Designed and Made for the Illinois Traction System by Davis Boring Tool Company, St. Louis

In operation the reamer is held at the far end in a temporary bronze bearing bolted to the compressor frame. At the gear end it is held by a similar bearing mounted on a framework attached to the housing. This frame is of 1½-in. x ½-in. wrought iron. The two end angles are bolted to the compressor housing, one angle having a slotted hole for the bolt, in order to allow vertical adjustment of the reamer bearing. The bearing is mounted on the cross member between the two angles and is fastened by a winged nut on a bolt set in a slotted hole. This allows adjustment in a horizontal direction.

First a trial cut is made to determine the alignment of the reamer. By turning the adjusting dial, which is marked similar to the graduations on a micrometer caliper, the blades may be extended as little as .001 in. Thus it is possible to ream the bearing to the exact size required.



Set-Up for Reaming Gear End Bearing in Compressor Housing. By Moving the Dial, Minute Adjustment of Reamer Is Possible

About five minutes is required for setting up this reamer and apparatus. The reaming requires about ten minutes, the reamer being turned by hand by means of a cross bar which fits on the square shank. A set-up similar to the one described and illustrated is used when reaming the other bearing of the compressor.

Oxy-acetylene Torch Aids Armature Room Work

IN THE armature room of the Kansas City Railways Company, a small-sized oxy-acetylene torch, designed primarily for lead-burning work on storage batteries, has been found to be a very handy utility device.

Cleaning solder out of stripped commutators and for sweating terminals in controller repair work, are both very efficiently done by means of this torch. It concentrates a small, hot flame on the work and helps materially in getting a better job of soldering.

As an illustration of the savings produced by this torch, its use has reduced the time for stripping and rebuilding K-14 controllers by as much as two hours per controller. This includes the time taken for stripping the old controllers and soldering the new leads to the terminals.

New Equipment Available

Sight Tube Facilitates Inspection

FOR the purpose of determining the conditions inside the tanks of large oil circuit breakers without the necessity of emptying the oil, the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has perfected a sight tube, built on the principle of the periscope. This sight tube may also be used for inspecting other equipment in inaccessible places. The present design requires a hole 10 in. in diameter for insertion of the tube.

At the end of the tube, in a bulb-shaped compartment, a 100-watt, 110-volt lamp is placed so that its rays illuminate the area in front of the lower sighting hole of the tube. A circular mirror, directly above this lamp and opposite a glass-covered opening in the tube, is placed at an angle of 45 deg. to the perpendicular axis of the tube so that it reflects an image of whatever is illuminated by the lamp.

Periscope Used to Examine Contacts of Large Oil Circuit Breakers

The tube is built in three lengths, 5 ft. 3⅜ in., 6 ft. 2 in., and 6 ft. 7 in.

Improvements Made in Bending Rolls

SEVERAL improvements have been introduced into its series of bending rolls by the Buffalo Forge Company, Buffalo, N. Y. Easier and more even adjustment of the rolls has been secured through the replacement of the springs supporting the top roll and bearings with a balanced lever. Less pressure is also required to regulate the rolls, and the wear on the controlling mechanism is thus reduced. A new spacer arrangement provides an easy and quick adjustment of the space in the rolls necessary to take care of the thickness of the pipe being bent. In addition to the bending of the many forms of structural shapes, these rolls can be used for bending rails, wrought-iron pipe, and odd sections.

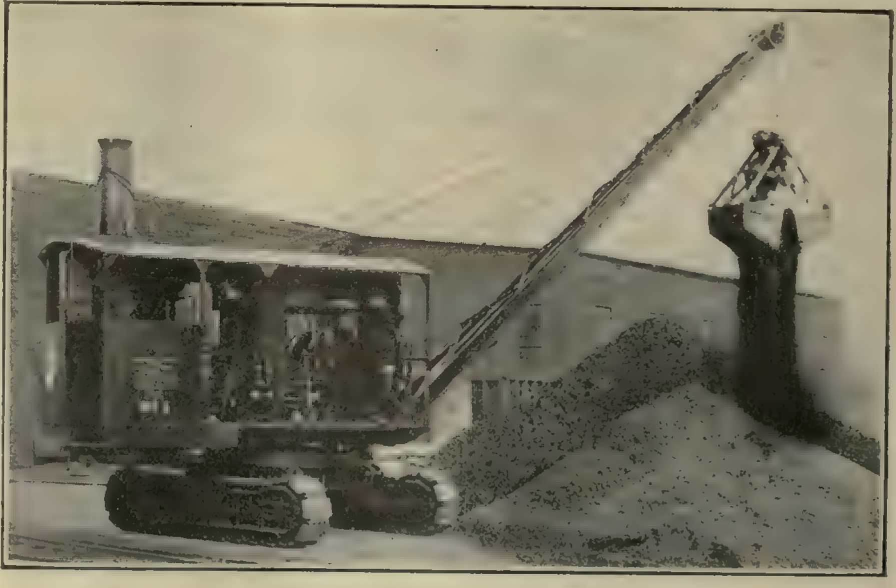
New Crawling Tractor Crane

A 10-TON crawling tractor embodying new features is being offered to the market by the Industrial Works, Bay City, Mich. An important feature is the independent control of the traveling, slewing and hoisting motions. Slewing in either direction is accomplished without reversing the engine by means of a double friction clutch and a train of bevel and spur gears. A slewing brake holds the boom securely with a suspended load in any position. When operating on uneven ground, this brake eliminates any possibility of sudden rotation. The vertical slewing shaft is located accessibly at the front of the crane close to the base of the boom, and since the power is transmitted at this point, there is no great slewing stress carried through the revolving frame.

The entire upper works rests on a rotating steel base. This base rotates on four conical steel rollers which may be taken out without removing any of the parts or jacking up the crane. Heavy steel side frames which carry the shaft bearings are bolted to this rotating bed. The bearings are arranged on the outside of the frames so that any shaft may be easily removed without displacement of other parts. All running bearings are provided with replaceable bronze bushings. Wearing surfaces of all thrust bearings are separated by bronze washers, and bronze collars are placed behind each bevel gear. Gears in the upper works are of cut steel. Oil pipes lead to the operator's platform and the lubrication is accomplished by a pressure system. Clutches controlling the various motions are of a new friction type.

Tractor shoes are close fitting, smooth surface steel and they operate over adjustable idle sprocket bearings which take up the slack in the tractor belt. The crane has two traveling speeds, reversal of direction is accomplished by reversing the engine. Steering while propelling is accomplished from the operator's platform through friction clutches and brakes controlling each tractor belt. Either belt may drive, coast or be held by the brake in any degree desired to negotiate turns.

The new tractor crane is built for either steam, electric or gasoline power, and can be operated with clamshell or dragline bucket, electromagnet, hook and block or grapple. It is readily convertible into a shovel or a pile driver.



Small Crawling Tractor Crane

The News of the Industry

Transfer Plan Changed

Pittsburgh Riders to Have Advantage of Riding from One End of City to Other for 8⅓ Cents

A most important transportation step was taken recently by the Pittsburgh traction conference board when it announced a general transfer system which will mean reaching all points on the system of the Pittsburgh Railways in the downtown business section and in a northside area from any part of the city for a single fare.

The old transfer limitations, which have existed between the systems of the Consolidated, Union Traction companies and the Southern Traction Company, are broken down and the interchange of passengers between the systems permitted. All railroad stations are included within the new transfer zone, making them available from all parts of the city for the single fare. The new zone embraces the entire downtown triangle and one of almost similar size and shape on the Northside. Privileges now available over a limited area on the Crosstown line will be extended over the entire area. The area also embraces West Carson Street between the Point and Smithfield Street bridges.

One of the problems worked out was the identification of holders of the special transfers. This was accomplished by placing the responsibility of getting off before the limit of the zone area is passed. Transfers will be lifted on departure from cars and should passengers delay this beyond the zone boundary, it will be necessary to drop the regular fare.

It also was necessary to solve some of the problems offered by the custom of years to observe a financial segregation plan effecting the various railway units held by the Pittsburgh Railways before the new transfer plan could be developed.

According to the statement of the traction conference board, the new arrangement not only will provide a vast increase to the service given car riders, but also will have a general beneficial effect on all business within the triangle. In addition the tendency will be to relieve traffic congestion by spreading business.

The board also announced the summer high school concession which will be an innovation and enable students to reach the Schenley and Southside High schools for a single fare, not in excess of 10 cents in each direction. At present often two fares and in some cases three fares are required for each trip., No statement was made as to whether this plan would be extended into the regular school year.

A third improvement in the service announced was that of providing a single fare limit to boundary of the Twenty-eighth Ward.

The board, in announcing the improvements to the service, said:

> All these changes disclose the new spirit of the organization of the Pittsburgh Railways and are the first fruits of the plan of co-operation between the city and the company. All these changes will inure to the benefit not only of the car rider, but to the public generally.

Electrics Not Hard Hit in Ohio Tornado

Heroic efforts of repair men of electric railways operating in the tornado swept district of northern Ohio have paved the way for a quick resumption of service. It was expected that July 5 would see the interurban lines running on complete schedule. The Cleveland, Southwestern & Columbus possibly was the hardest hit by the tornado, which leveled the business districts of Lorain and other Ohio towns. Officials of the Lake Shore Electric said on Monday that all lines would be in operation by the end of the week. The Cleveland, Southwestern & Columbus suffered between fifty and sixty washouts, with both poles and wires down. A special carrying 200 people to a picnic at Chippewa Lake was marooned there. People slept in the car all Saturday night and were not able to return to Cleveland until late Sunday afternoon.

The greatest loss to the Lake Shore Electric was from interruption of service, officials say. Wires and poles were blown down in some instances, but extra men from various utility companies were rushed out and damage is being rapidly repaired. The company's service to Lorain was not cut off, while the Toledo & Fremont division also operated. The Fremont & Sandusky division was cut off by storm damage. The roadbed is practically intact. A Lorain city car was picked up from the tracks by the cyclone and hurled across the street. With the resumption of service on all lines of the Cleveland, Southwestern & Columbus the problem facing the company now is to make construction work permanent. Company officials say the damage will run not more than $7,000.

Connecticut Wages Advanced Three Cents

Negotiations between the Connecticut Company, New Haven, Conn., and its employees were terminated on June 28 when wages were adjusted on a basis of 3 cents an hour increase effective June 1, 1924, for a period of one year. This agreement covers motormen and conductors, one-man car operators, shopmen, power station men, substation and line men. The new schedule makes the blue uniform rate 53 cents for the first three months, 56 cents for the next nine months and 60 cents an hour thereafter. The one-man car differential remains at 7 cents.

Controversy in Cleveland Over Arbitration Reaches Court

Peace—temporary at least—has come in the differences between the trainmen and the Cleveland Railway. By mutual consent the date for hearing the injunction action of the union against the company, in the dispute over the 12-cent wage award, has been postponed until Sept. 8.

All strike activities of the union and preparations on the part of the company to meet a possible strike have been abandoned until the case is settled. Both sides now are busy preparing for the court hearing. In the meantime the employees are working under the agreement in effect before the wage arbitration.

Strike preparations of the company cost $47,000, according to City Traction Commissioner C. M. Ballou. The average expenditures were more than $10,000 a week and included an extra pay roll of non-union crews held in reserve, which at times ran as high as 400 men.

Paul E. Wilson, secretary of the company, says a few of the extra men might be employed permanently, but that under the temporary restraining order of the court they would be employed only subject to customary closed shop rules and would have to join the union after sixty days.

It was the general opinion of observers that the union men, after voting to strike when the company refused to accept the award of the arbitrators, really did not want to strike. John J. Stanley, president of the company, openly declared that the men could not be driven from their jobs by any threats of intimidation.

Weekly Pass Shuts Out Monthly Commutation Books

Permission has been granted by the Railroad Commission to the San Diego Electric Railway and the San Diego & Coronado Ferry Company to cancel and discontinue the sale of the monthly commutation fare books from San Diego and Coronado, Ocean Beach, National City, Potash and Chula Vista.

It was shown at the public hearing in San Diego that since the establishment of the weekly pass on Jan. 1, 1923, the sales of monthly commutation books have steadily declined, and that the weekly pass now supplies all reasonable demands of the commuting patrons. It was shown that the weekly pass has solved to a substantial extent the financial difficulties of the applicants, 321,547 weekly passes having been sold during 1923 for $330,610. During the first three months of 1924 the weekly passes produced 2,257,191 passengers, compared with 1,948,043 passengers for the same months last year.

Delinquent Seattle Tax Paid Under Protest

Officials of the Puget Sound Power & Light Company, Seattle, Wash., on June 7 issued to County Sheriff Matt Starwich a check for $655,296 as payment in full of taxes in litigation. Of this sum $254,262 represented interest accumulated since the tax fell due in 1920. The payment represents another move in the litigation between the company and King County over $401,018 street railway taxes for 1919 plus interest.

The company accompanied the check with a protest which sets forth that the payment was made under compulsion and that the company reserves all legal rights, which it may succeed in establishing in court.

On the same day the payment was made to King County, counsel for the Puget Sound Power & Light Company submitted an amended bill of complaint in the federal court, to take the place of complaints dismissed recently, in which it was set forth that the tax had been paid, and that action would be taken to collect three-fourths of the amount from the city. The city, through George A. Meagher, assistant corporation counsel, contested acceptance of the amended complaint, holding that the case was not one for the federal court. Specific performance of the contract between the city and the power company, made at the time the railway lines were purchased by the city, is sought in the amended bill. Mr. Meagher indicated that he intended to attack the sufficiency of the bill on the ground that it did not set forth a cause of action in equity.

The payment of the tax has been the subject of litigation since it became delinquent on March 15, 1920. Collaboration by the city and company to avoid payment of the tax altogether was attempted, but failed, the United States Supreme Court ruling that the tax is valid. Then, with the company officials avowedly ready to pay the company's share, Corporation Counsel T. J. L. Kennedy advised the City Council that it was without authority to raise the tax money. The Council, Attorney Kennedy held, had been without authority to bind the city in the tax agreement. Unable to wait longer for the money, the county treasurer took steps to force collection, with the ultimate result that the county sheriff seized $2,000,000 of company property in distraint proceedings upheld in the federal court, which refused to grant the power company a stay of execution.

Motorman Held at Fault

San Francisco Operator Failed to Report Broken Brake Rod on Car Which Ran Away

Various probes have disclosed that the accident on the San Francisco Municipal Railway on June 2, in which fifty persons were injured, was due primarily to the failure of a motorman to report a broken brake rod. This is the substance of the report of the police, the railroad officials and the city authorities following an exhaustive investigation.

NO FORMAL REPORT MADE

In the opinion of the investigators the motorman should have done one of two things:

1. Halted his car and reported the broken rod when he first discovered it.
2. Waited for another car to tow his car to a repair shop.

The motorman's own story, as related to the police, is at variance with these findings. The official police report reads:

> Motorman Frank Cronin of K line car No. 65, Municipal Railway, reports that the rod broke just after leaving the Forest Hill station eastbound. He proceeded down hill, being able to control the car for a time. It finally got away from his control and hit three autos in its rapid descent to the entrance of the tunnel at Market and Dolores Streets, where it telescoped L line car Number 176.

The police report adds, however, that Cronin admitted having trouble with his brakes before reaching the Forest Hill station, which is a half mile from the scene of the accident.

The grade is very steep leading to the tunnel. It appears from reports and from statements that Cronin believed he could control the car until it started on its wild dash down the hill toward the tunnel.

Immediately following the crash Superintendent Boeken of the railway made a statement blaming the motorman and also suspended Cronin. Later Cronin was discharged.

No official report of the accident had been made available to the press up to June 17 and officials of the city and railway appeared reluctant to discuss details. The public utilities committee of the Board of Supervisors, however, has the matter before it.

The city engineer, Mr. O'Shaughnessy, has made an investigation through his electrical engineer, but up to June 17 he had made no report.

It is claimed that there was no trouble with the air pressure, as the police at first reported. The main pull rod was found on examination to have broken in two, due to wear.

City officials say that there will be no more investigations or probes. They all refused to be quoted. It was stated in behalf of the railway that a full report on the matter will probably be printed in the annual report, which was due on June 30. This report, however, is not likely to be given out for publication, it was also stated, until some time in the fall.

Employees Clearing Away Wreckage from One of the Cars in San Francisco Collision

Buses Discussed in Kansas City

Application for incorporation of the Kansas City Motor Coach Company is the first move toward urban bus line operation in Kansas City. The initial capital of the company is $10,000. Powell C. Groner, a representative of the J. K. Newman interests, which are active in the reorganization of the Kansas City Railways, owns 996 shares of the 1,000 which have been subscribed, it is said.

On the same day the application was filed Mayor Beach was sounded in behalf of the company on the administration's attitude toward urban bus line service. The Mayor would not discuss the proposition and would not give his views on a franchise for the proposed bus line, as he was not familiar with the street railway's reorganization plans, being newly elected to his present office.

Until a reorganization of the railway can be effected the bus service will probably not be started in conjunction with the operation of the railway system. An extensive survey of the bus for use by downtown shoppers has been conducted by the Business District League, which is convinced that Kansas City cannot afford to lag in this traffic development. One definite offer to install a fleet of buses already has been received.

The City Commissioners have designated A. H. Strickland, one of their number, and H. J. Smith, city attorney, to draw up an ordinance to regulate the bus lines and to make bus operation legal. Harry J. Kaelin, park commissioner, and Commissioner L. H. Chapman are in favor of the bus lines and Mayor Gordon has voted for the appointment of the committee to frame the bill.

Additional Comforts of Interurban in Ohio Attract Patronage

Seat covers have been introduced by the Northern Ohio Traction & Light Company on cars in its Akron-Cleveland interurban service to promote travel between the two cities. Figures indicate there has been approximately a 10 per cent increase since June 4, when this particular service was started. In addition to this, the cars were repainted inside and out.

Attention was called to the new service by newspaper advertising and by cards in the street cars. These cards displayed a picture of the interior of one of the cars with a solid blue background and lettering of white saying, "A Pullman Service for You—Clean Seat Covers and Clean Cars Daily. Please Do Your Part by Co-operating to Keep Them Clean. The N. O. T. & L. Co."

Folders were circulated calling attention to the covers for the seats and the cleanliness of the cars.

Another folder issued was intended for the trainmen. It pointed out the necessity for courtesy, declaring that the increase in business secured by the added feature could easily be driven away by one discourteous act on the part of a trainman.

New Bus Lines for Boston

The City Councils of Cambridge and Somerville have recently passed enabling ordinances whereby the Boston Elevated Railway will start three new bus lines connecting these cities with Boston. In addition, the Cambridge Council on July 1 authorized three new bus lines within Cambridge, to be operated by the Boston "L." One of these will take the place of a rail line on which one-man cars are operated, and for which the bus service will be substituted rather than to replace the track. The other two lines will be in the nature of additional service, increasing the usefulness of the Boston "L" transportation system. About twenty buses will be required for these new lines and further expansion of the Boston "L" bus operation is coming very rapidly. The company also has applications pending for bus lines which will extend the rail service beyond Malden. This means the carrying out of the transportation plan at the Malden Center as announced by the company about a week ago.

Messrs. Delaney, Ryan and De Ford on New York City Board

Mayor Hylan of New York completed the selection of the personnel of the new Board of Transportation on July 1 when he named as its third member William A. De Ford. The three members of the new board are:

John H. Delaney, until recently Commissioner of Docks, who was the Transit Construction Commissioner antedating the present Transit Commission. He is regarded as an expert in transit matters and has been Mayor Hylan's chief adviser on subways.

Daniel L. Ryan, who was Deputy Commissioner under Transit Commissioner Delaney. He is secretary of Tammany Hall, a position which it is expected he will relinquish.

William A. De Ford, who has been personal counsel to William Randolph Hearst and general counsel to Mr. Hearst's organization since Oct. 1, 1915. He was also special counsel representing the Mayor at the hearing held by the State Transit Commission.

Commissioner Delaney will be the chairman of the new department for a term of six years. Commissioner Ryan's appointment is for four years and Mr. De Ford's for two years. The Board of Transportation will plan and construct all new city subways. The salaries of the new commissioners have been fixed at $15,000 each.

Ten-Cent Fare Authorized in Westchester

Holding that the present fares are not carrying the necessary provision for the upkeep of the properties and other operating charges, the Public Service Commission approved on June 26 a fare of 10 cents on the Tarrytown, Silver Lake Park and Scarsdale lines of the Westchester Street Railroad. Action on the proposed increase within the city of White Plains and the zones in the Mamaroneck Avenue line was deferred until further order. The increased fares are effective to Dec. 1, 1924.

The decision of the commission was made on the petition of Leverett S. Miller as receiver of the road. With his application there was filed an order of the Supreme Court of Westchester County, directing the receiver to stop service on portions of the lines and to apply to the commission for an increase in fare on other lines or portion of lines.

Revenue passengers carried in the five month period in 1923 numbered 1,517,752 and in 1924, 1,303,999. A falling off of nearly 10 per cent in the Tarrytown and Scarsdale lines and about 5 per cent on the other lines in passengers carried in the same period by lines operated in the two years is shown by the evidence.

What the Motorist's Outgo Could Do for the Beaver Valley

Human nature as embodied in an automobile owner rather resents the suggestion that he is unduly extravagant in the use of his pet. But there are more ways of giving that hint than the cut direct. This has been cleverly proved by C. D. Smith, manager Beaver Valley Traction Company, who instead of stating that automobilists are liable to go broke, takes the opposite tack, in his advertising, of apparently assuming them to be a bunch of Crœsuses whose mere riding expenditure would carry everybody free via trolley, make 300 pairs of honeymooners still happier and pave 48 miles of streets to boot. A typical ad follows:

> If the 7,500 automobile owners in Beaver County will pay to us annually a sum equal to the cost of operating their automobiles we could transport them and all our patrons free of charge and build, completely furnish and donate to each of 300 couples an $8,000 home, or pave 48 miles of streets in the towns.

New Fare in Effect on Queens Line

The New York & Queens County Railway, Long Island City, began collecting a 6-cent fare at midnight on June 29. Large placards announcing the new fare were carried on all the cars of the company. So that there might be no delay for the passengers, the receiver for the line's had collectors at important transfer points to make change for the passengers while they were waiting for cars. The company officials said no objections to paying the extra cent fare has been reported by conductors.

Corporation Counsel Nicholson announced on June 30 that, in compliance with Mayor Hylan's instructions, he was preparing papers for injunction proceedings to restrain the company from collecting the additional fare.

Officials of the company said that they believed the company was $350 richer as the result of the operation for the first day of the 6-cent fare, which the New York Transit Company ordered it to put into effect.

Electrification of Texas Steam Line Progressing

Work is progressing rapidly on the electrification of the Missouri-Kansas-Texas railway from Dallas, Tex., to Denton, Tex., a distance of 48 miles. Richard Meriwether, vice-president and general manager of the Texas Interurban Company, which is carrying out the electrification project, has announced that service over the line will probably be started by Oct. 1.

Work of setting poles and stringing the trolley wire is going forward rapidly, crews working out of both Dallas and Denton. About on-half the line has been completed, with reference to the stringing of the trolley wire. Work of repairing the track and putting it in condition for fast interurban service is also going forward.

The three substations that are to be established are nearing completion, and electrical equipment will be installed in the building soon. These stations will be near Carrollton, near Lewisville and near Denton. Each will be altomatic.

Orders have been placed for cars to be delivered prior to October 1, Mr. Meriwether said. Cars are of the type now in use on the Dallas-Terrell interurban, described recently in the ELECTRIC RAILWAY JOURNAL.

South New Orleans Property Destroyed by Lightning

The shops of the South New Orleans Light & Traction Company, Algiers, La., were struck by a bolt of lightning June 27, during an electrical storm, and was completely destroyed by fire which followed.

The officials of the company declined on June 29 to attempt to appraise the measure of damages sustained by the company, though it was said that the reported losses were greatly overestimated. The company will, it stated, rebuild anew, but this was as much information as the company was prepared to give out at this time.

Maryland Line Granted Fare Increase

An increase of 20 per cent in all one-way and round-trip tickets has been granted the Washington, Baltimore & Annapolis Electric Railway by the Maryland Public Service Commission. The decision was handed down on June 30 and the new rates became effective July 1, to remain until July 1, 1926, unless modified or abrogated by the commission. In granting the company's petition for the increase on straight fares, the commission denied the request for a 10 per cent increase in commutation fares.

The increase granted is expected to add approximately $313,200 to the annual revenue of the company, the commission said. During 1923 the company increased wages of shopmen and trainmen a total of about $194,000.

The commission said that it believed it inadvisable to raise commutation rates at this time or to do anything which would tend to discourage the rapid development of the country along the lines of the road.

Boston "L" Officials Inspect Property

Officers and heads of departments of the Boston Elevated Railway, under the guidance of Edward Dana, general manager, made their annual inspection of the property on June 12. The purpose of this was to acquaint the staff with recent developments.

The party started from the company's new offices at 31 St. James Avenue and visited in turn the South Boston power station, the Andrews Square substation and the Lotus Place carhouse, stopping en route to call upon superintendent of inspection Clarence E. Learned, who has been seriously ill. Next the party covered the new Roxbury bus route, and after stopping for lunch at the Engineers' Club, examined the work on the East Boston tunnel, which had recently been changed from surface line to rapid-transit operation. The new school rooms at Sullivan Square and the extensive Everett shops were visited, and finally the George Street yard with its new fireproof storehouse.

Rights of Commission Upheld in New York Fare Case

The Legislature of New York has the power to change rates even though they were established as a condition for the consents given to franchises, and to exercise that power through the agency of the Public Service Commission. This is the substance of the opinion of the Appellate Division just handed down in the case of the village of Brownville against the Public Service Commission and the Black River Traction Company of Watertown. The decision was a result of a review by certiorari of the action of the commission in permitting the traction company to eliminate a 15-cent rate for round trip tickets between Watertown and Brownville and substitute a rate of 20 cents. The opinion confirms the determination of the commission in the matter, with costs and disbursements.

The court speaking through Justice Harold J. Hinman, said among other things:

> The present determination of the Public Service Commission was made during the period in which the Legislature had conferred upon the Public Service Commission the power to regulate such rates of fare notwithstanding any "franchise condition, consent or other agreement."
>
> The petitioner contends that the amendments of 1921 are unconstitutional, and further that the new rates are unjust and unreasonable. The Public Service Commission has determined that this increase of rates was just and reasonable, and we see no reason for disturbing that determination.
>
> We are also satisfied that the Legislature has the power to change rates even though they were established as a condition for the consents given under the constitutional provision in question. . . . In the case of People ex. rel. Village of Mamaroneck vs. Public Service Commission, we expressed the opinion that the Legislature had the authority to delegate this power to the Public Service Commission, but that the Legislature had revoked that power by the repeal of the statute conferring it and that the Public Service Commission should be prohibited in that case from exercising such delegated authority after the revocation of its authority. That situation is not involved here. but the Public Service Commission has made its determination in this case during the period during which it had the express authority to act under Section 49 of the Public Service Commission Law as amended by the laws of 1921 . . . we think the determination of the Public Service Commission should be confirmed.

Electrics Join with Trucking Company

The Buffalo & Lake Erie Traction Company, Erie, Pa., has filed a joint freight tariff with the Interstate Commerce Commission, the New York Public Service Commission and the Pennsylvania Public Service Commission for handling freight in conjunction with the E. H. Scott Transportation Company, a large trucking company operating from Buffalo to Cleveland and points West.

In making this arrangement the trucking company has agreed to withdraw from the territory served by the Buffalo & Lake Erie Traction Company between Buffalo and Erie and devote its energies to points West. Under the new agreement the trucking company will no longer be a competitor of the railway, but the railway adds to the territory it can serve. It is expected that a lucrative business can be secured through this connection.

The Scott Transportation Company operates a fleet of about 50 trucks and trailers of large capacity. It has just received a certificate of public convenience from the Pennsylvania Commission.

The new connection will also enlarge the territory served by the electric fast freight lines, which association includes the following:

Auburn & Syracuse Electric Railroad.
Empire State Railway Corporation.
New York State Railways.
Northwestern Electric Service Company.
Rochester & Syracuse Railroad.
Rochester, Lockport & Buffalo Railroad.
Jamestown, Westfield & Northwestern Railroad.
Chautauqua Traction Company.
Buffalo & Lake Erie Traction Company.

Moreover, the new arrangement fills the gap in the route between Cleveland and Erie which was caused by the discontinuance of the Cleveland & Erie Railway, an electric railway which ran west from Erie.

$25,000,000 New York Bus Bill Put Over to Fall

Mayor Hylan of New York, at a meeting of the committee of the whole of the Board of Estimate and Apportionment on June 9, declared that he was working on what he hoped would be a solution of the bus problem in New York City. The Mayor intimated that he had a plan which he thought would eventually obtain authorization from the Legislature for the appropriation of $25,000,000 wherewith to purchase and operate a fleet of 3,500 buses. This prediction followed discussion on the proper disposition of an old resolution calling for such an appropriation.

In conformity with the Mayor's wish, the committee of the whole also laid over until September a total of twenty-three resolutions which dealt with bus franchise matters.

Investment and Advertising Books Coming

Thomas Conway, Jr., president of the Chicago, Aurora & Elgin Railroad, Aurora, Ill., reports to the Investment Bankers' Association of America that satisfactory progress is being made in preparing the book on public utility investments, upon which he is at work. The time limit fixed for the completion of the work is the beginning of the fall academic term. Mr. Conway says he has every reason to believe that the volume will be completed within the time limit specified. With respect to the book on investment advertising, E. Paul Young, manager of the investment department of the Illinois Power & Light Corporation, Chicago, says that his activities in connection with the book for the past few months have been devoted mostly to the collection of information and illustrations to demonstrate the principles explained.

Increase in Fare in Effect in Des Moines

Des Moines went back to the 8-cent fare on June 29. F. C. Chambers, president of the Des Moines City Railway, recently notified the City Council of an intended increase in fare to 8 cents as required by the franchise agreement.

The auditor's report for the month of May showed an operating deficit of $29,852. This reduced the stabilizing fund to $75,174, or practically $25,000 below the figure necessary to continue the 7-cent fare.

Under schedule B, which becomes operative again for the first time since Dec. 27, 1923, when the present 7-cent fare took effect, the fare is 8 cents, with ten tickets selling for 75 cents. The next relief measure provided by the franchise, which will be to abolish the ten-ticket sale after another thirty days.

Figures presented by President Chambers showed that the number of revenue passengers carried in May was 2,577,124, a decrease of 98,410 from May, 1923. At the same time wages of the trainmen advanced $10,666, and operating revenue dropped from $207,489 a year ago to $177,599.

Philosophy Behind Richmond Publicity Discussed

"Frank Publicity for a Public Utility" was the topic of an address which A. H. Herrmann, assistant to the president of the Virginia Railway & Power Company, delivered June 24 at the Richmond, Va., Advertising Club meeting. In concluding his address Mr. Herrmann said:

> Unlike some utility companies, we do not have what is known as a public relations department. Every department in our company is made responsible for maintaining cordial relations with the public and gaining good will for Virginia Railway & Power Company service, particularly with the part of the public with which that department is coming in contact. To the end of educating employees our company issues to them a little bulletin entitled: "Man to Man Talks." Some of these messages are signed by the president of the company, and others by the general manager, and they are followed up by suggestions from superintendents and department heads, who discuss them with the men.
>
> We encourage a speaking, or at least a writing acquaintance, with our riders through a little leaflet "Public Service News," which we place on all of the cars. We get many letters from the public, some of them lauding service and some making suggestions concerning it. We get lots of communications through this leaflet and these letters from the public encourage the men. We consider them very valuable.
>
> Our Car Bulletin is another medium adopted by the company to bring to the attention of the public matters of interest to them. Newspaper space is, of course, the most far-reaching medium to be had and our company is not unmindful of its great value. Of late we have been using the newspapers to inform our patrons of extensions of service that our company proposes in connection with its new franchise.
>
> Practically all our ads are captioned "At Your Service." We believe this carries the spirit which marks our effort to serve the public.
>
> The State of Virginia has been dilatory in providing proper protection for invested capital, particularly investment in transportation, and until there is a change for the better or until Virginia municipalities recognize the situation and take some steps to correct present injustices, public utilities must confine their efforts to protecting the capital that already is invested, rather than attempt to reach out for more. You can confiscate capital already invested, but you cannot force new capital to invest.

The company, through Mr. Herrmann, relates in a twenty-two-page pamphlet what public good will really is and what are the main elements in the making of good public relations in Virginia. To this company the only sound basis for good public relations lies in good service plus frank publicity and personal contact. In summarizing the situation the pamphlet says that the maintenance of good public relations rests on three legs—the regulatory body, the investor and the company, including all of its employees.

California Commission Denies Request to Abandon Part of Line

The California Railroad Commission recently denied the Pacific Electric Railway, Los Angeles, Cal., permission to abandon a portion of its service on the Santa Monica Air Line from Santa Monica along the ocean front to the terminus of the line at Santa Monica Canyon. Some time ago the commission held a hearing in Los Angeles and the company presented much evidence showing that the operating costs of the line were in excess of the revenue. At a rehearing on Jan. 2, 1924, considerable testimony was introduced to show a possible future necessity to the territory northwesterly from the terminus of the line.

The commission ruled that the future development of the territory served by the line would require rail transportation and that for the present the line should not be removed. The commission recognized the loss connected with the operation of the line and agreed to allow the railroad to put into effect a supplementary proposal for the operation of only a portion of the line. The commission's order allows the railway hereafter to operate hourly service over the route.

Plainfield Buses Authorized.—Substitution of buses for electric cars on three routes in Plainfield, N. J., has been authorized by the Board of Public Utility Commissioners of New Jersey in two decisions disposing of an application by the Public Service Railway for permission to abandon its lines and the Public Service Transportation Company for approval of an agreement with the city of Plainfield for operation of motor buses. As noted previously in the ELECTRIC RAILWAY JOURNAL all railway lines of the company in Plainfield are to be abandoned except the Union Line, which runs through Bound Brook, Elizabeth and to Newark.

Men Awarded Increase.—According to a decision of the board of arbitration, employees of the Manchester & Derry Street Railway, and the Manchester & Nashua Street Railway, Manchester, N. H., were awarded an increase of 5 cents an hour for operators of two-man cars. An additional 7 cents an hour was granted to operators of one-man cars. Both properties are owned by the Manchester Traction, Light & Power Company.

Seven-Cent Rate Asked in Ogden.—The Utah Rapid Transit Company has petitioned the Utilities Commission for permission to raise fares from 5 cents to 7 cents within city limits of Ogden. The company proposes to sell fifteen tickets for a dollar and to raise students' commutation tickets from $1 for forty tickets to $1.40. Current revenues are declared insufficient to cover operating costs and maintain satisfactory service. The petition also says the railway has never paid dividends on its capital stock, is in arrears on bonded debt interest and in the next year will be required to set aside a sinking fund to apply on the mortgage.

Men Seek Wage Advance.—Employees of the Berkshire Street Railway, Pittsfield, Mass., are seeking an increase in wages. Conferences between the management and the committee have not resulted in any decision. Trainmen on two-men cars now get a maximum of 50 cents an hour and on one-man cars 66⅔ cents an hour.

New Extension Opened.—The Shreveport Railways, Shreveport, La., began service on the Jewella extension on June 26. Jewella is an industrial suburb of Shreveport and it is the company's belief that the expenditure involved in making the extension has been made for Shreveport's future. The extension which begins at the end of the Fair Grounds and runs through Jewella to the city limits is 3,400 ft. long. The opening was extensively advertised and was attended with much celebrating and speech making.

Wage Scale Continued.—The present wage scales of the Brooklyn-Manhattan Transit Company, Brooklyn, N. Y., will be continued for another year, according to a recent decision of the board of directors. It conforms with the recommendations of President William S. Menden, which followed conferences between Mr. Menden and committees of the employees. The wage scales are effective Aug. 1 and apply to all motormen and conductors on the surface lines and to all trainmen on the subway and elevated lines. The directors also authorized the officers of the company to agree with other groups of employees on continuance of present wage scales.

New Bus Line Started.—The New Orleans Public Service, Inc., has started a new cross city bus line, along Carrolton Avenue from Tulane Avenue to the city park. Two single deck buses have been placed in service, but three more will be added as the exigencies demand. The fare will be 7 cents, the same as obtains on the railway lines, to which transfers will be issued. The New Orleans Public Service, Inc., also has in contemplation the installation of a new bus service along Frenchmen Street.

Further Arbitration Hearings to Be Held.—Another series of arbitration hearings will be held to determine what the wages and working conditions are to be on the Boston Elevated Railway system, Boston, Mass. Officials of the company and of the carmen's union have been unable to reach any agreement, except to agree to arbitrate. James H. Vahey has been selected as the representative of the union, and Charles F. Mulcahy will represent the company. They will select the third member of the arbitration board, and he will serve as the chairman. It is understood that the union is preparing fourteen points to submit to the board for its consideration.

Operation Resumed in Atlantic City.—The strike of the platform men on the Atlantic City & Shore Railroad, Atlantic City, N. J., has ended in favor of the company, according to a check-up made. The traction company has resumed operation with new employees. Many of the older employees are applying for their jobs, but are being treated as new applicants by the management, which charges they went out on strike in the face of a warning that loss of seniority would be the penalty. Some of the strikers had been with the lines for many years and were eligible soon for pensions.

Wages Will Be the Same.—Motormen and conductors of the Cincinnati, Newport & Covington Railway, Covington, Ky., will receive the same wages during the next two years as this year. This was announced on June 28, after the men had voted favorably on a proposal submitted by the company. The wage scale is as follows: First three months, 48 cents an hour; second nine months, 51 cents and after one year service, 53 cents. The contract becomes effective Aug. 6.

Group Insurance Plan Started.—In recognition and appreciation of loyal co-operation rendered by its employees in helping build and improve its city and interurban transportation services to the public, the Rockford & Interurban Railway, Rockford, Ill., has started a group insurance plan retroactive to June 1. All employees in the service one year or more will receive policies at no charge to themselves. Those in service for one year and less than two receive $500 policies. An additional $100 is added for each year of service up to eleven years or more, where the sum is fixed at $1,500.

Detroit United Contract Renewed.—The employees of the Detroit United Railway through their union have renewed last year's wage and working agreement of 61 cents an hour for beginners, 64 cents after three months and 66 cents after one year, with 5 cents an hour extra for operators of one-man cars.

Application Denied.—The California Railroad Commission has denied the application of Peerless Stages, Inc., for a certificate to operate auto stages between points in the cities of Oakland and Alameda on three routes, all originating and terminating at the present depot of applicant at Eleventh and Clay Streets in Oakland. The action of the commission was conditioned, however, upon the establishment within sixty days of the commission's order of fifteen minute bus service by the Key System Transit Company, in the east and the west ends of the city of Alameda as proposed by that company.

Will Operate Two Days. — The Gardner & Templeton Street Railway, Gardner, Mass., will operate on Tuesdays and Saturdays on the stretch between West Gardner Square and Greenwood's factory in South Gardner, according to an announcement of Charles Melhado, president and general manager. Operations were discontinued on June 14 owing to competition from jitney lines. Tuesdays and Saturdays are the shopping days in Gardner and it is believed that sufficient patronage will be secured to make the running of cars a paying proposition. This property was formerly under the management of the Northern Massachusetts Street Railway, whose joint lines were disposed of in a receiver's sale on Jan. 1.

New Rate Filed.—The Citizens' Traction Company has filed notice of a new tariff on its city lines in Oil City and Franklin, Pa., effective August 4. The new fare will be 10 cents. Two metal tokens will be sold for 15 cents and a weekly pass, good on all cars in either city, will retail at $1.25.

Fifteen for $1 Discontinued.—The sale of car tickets at fifteen for $1 and seven for 50 cents will be stopped in Davenport, according to Tri-City Street Railway officials, who notified Mayor Louis Roddewig of the action. A straight fare of 10 cents or three tickets for 25 cents, will be put in effect from July 1 to November 1. If it is shown after Nov. 1, that the company can no longer operate without a monthly deficit, the fares will be changed permanently to 10 cents each. This action taken by the street car officials is in accordance with an ordinance adopted by the former City Council of Davenport and the Tri-City Railway on Dec. 19, last.

Railway Wins Damage Suit. — The Phoenix Railway, Phoenix Ariz., won a verdict recently against Mrs. Iva Carroll, who sought damages of $50,000 for personal injuries. She charged that the car started with a jerk as she was alighting and threw her to the pavement. The conductor in charge testified that she had stepped on a particle of loose mud, slipped and fell.

Bus Permits Stand. — The Public Service Commission has denied the request of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., for a rehearing in the matter of the petition of Benjamin W. Pizzuto, Jr., and Dennis J. Haggerty for permission to operate bus lines in Poughkeepsie to Seneca and Hopewell Junction, respectively. The commission on May 29 granted these men certificates of public convenience for the operation of bus lines over routes requested. The certificates provide that neither bus line shall carry passengers in either direction between the bus terminal in Poughkeepsie and the intersection of East Main Street in Wappingers Falls. The railway sought to restrain either from carrying passengers from any point to Wappingers Falls.

Subway Section Opened in New York.—The completed section of the Fourteenth Street-Eastern District subway, extending from Fourteenth Street and Sixth Avenue, Manhattan, to Montrose and Bushwick Avenues, through the Williamsburg quarter of Brooklyn, was successfully opened to public traffic on June 30.

Complete Guide Book Issued.—A complete guide and information book of Boston and its environs has been issued by the Boston Elevated Railway, Boston, Mass. In addition to pictures and maps, an alphabetical and classified list is included of local communities, buildings, parks and other notable places of Greater Boston, with brief directions for reaching them for a single fare on the cars of the Boston "L."

Special Twenty-five Cent Rate Draws Crowds.—More than 3,000 tickets were sold in one day recently when the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., by permission of the Public Service Commission instituted a special 25-cent rate between any two stations and good for any car during the day. The rate was made in order that patrons could have an opportunity of riding on the new cars purchased by the company and inspecting other new equipment.

Store Utilizes Cars for Event.—On the occasion of the opening of the fourteenth annual buyers and managers' sale at Goldsmith's department store at Memphis, Tenn., it was announced that chartered special cars of the Memphis Street Railway would bring patrons to the store gratis on opening day. Last year the same plan was tried and found to work well.

Jitney Operation in Dover Refused.—The applications of Arthur Seldney and Michael Kelly for permission to operate jitneys through Dover, N. J., were not approved by the license committee, on the ground that the granting of these licenses would only lead the town into controversial difficulties. In the refusal it was pointed out that some months ago checks submitted by these applicants had been permitted to go to protest; that the jitney operators in conference over the interpolation of the traction company schedule did not appear to have changed their tactics. The report stated that in the event conditions warranted a reconsideration of the applications at a later date the committee would be glad to review the subject again.

Franchise Deadlock in Rockford.—Members of the City Council of Rockford, Ill., recently refused "to kill" the twenty-year franchise application of the Rockford Traction Company which has been pending before the aldermen since January. Mayor Hallstrom and his supporters want the railway to submit an application for a ten-year franchise in conformance with recommendations of the Council's special transportation committee. It is the contention of the company that it will be unable to make the promised extensions unless a franchise is obtained for twenty years as it would be unable to borrow money for betterments on a franchise of shorter length.

Stage Service Sanctioned.—San Francisco-Sacramento Railroad has been authorized to operate an auto stage line for the transportation of passengers between Walnut Creek and Diablo, Contra Costa County, serving the intermediate points of Alamo and Danville. This service is established as a substitute for the electric railway service on the San Ramon branch of the railroad, which the commission recently authorized the company to abandon. This abandonment was referred to previously in ELECTRIC RAILWAY JOURNAL. The same rates and schedules will be maintained by the buses as formerly applied to the electric railway.

Additional Bus Authorized. — The Public Service Transportation Company a subsidiary of the Public Service Railway, Newark, N. J., has been authorized to operate an additional bus on the Cramer Hill route in Camden. Recently the Board of Public Utility Commissioners of New Jersey granted permission to the Public Service Railway to abandon service on the North Cramer Hill line, Camden, N. J. The company has also been authorized to abandon service between Roselle Park and Kenilworth, N. J.

A Four Months' Bus Experiment.—The East St. Louis & Suburban Railway has received permission from the Belleville, Ill., City Council to substitute buses for cars on the Oakland division of the Belleville city lines for a four months' experiment. At the expiration of that time the city will determine whether to continue the buses or restore the cars. The buses will connect with the St. Louis line at the Court House Square and other local lines of the company. The fare will be the same as that charged on the cars.

Financial and Corporate

Grand Rapids Does Better

$58,000 Increase in Net Income in 1923—Prospects Ahead for Payments to Preferred Stockholders

For the year ended Dec. 31, 1923, the Grand Rapids Railway, Grand Rapids, Mich., reports net income of $64,674. This compares with $6,583 for the previous year. The report was presented to the stockholders under date of June 19. The statement in which the results of operation for 1923 and 1922 are compared is presented in the accompanying table.

The improvement program carried out in 1923 was one of the most extensive ever undertaken by the company. Total expenditures during the year were $346,129 of which $221,404 was devoted to the reconstruction of railway track, paving, etc., and $124,725 to the purchase of eight one-man safety cars, six buses and the remodeling of twenty-eight double-truck cars into a modern type equipped with standard safety-car devices so that they could be operated as one-man cars.

STATEMENT OF INCOME AND EXPENSES OF GRAND RAPIDS RAILWAY

	1923	1922
Gross earnings:		
Passenger revenue	$1,754,300	$1,813,246
Revenue from special cars, etc.	1,604	1,171
Rent of equipment, tracks, etc.	54,979	43,223
Non-operating revenue	6,723	3,836
Total	$1,817,606	$1,861,476
Operating expenses and taxes:		
Operating expenses	$1,121,186	$1,215,521
Taxes	135,963	132,404
Total	$1,257,149	$1,347,925
Gross income available for fixed charges, depreciation and dividends	$560,457	$513,551
Interest on funded debt	222,000	223,000
Other fixed charges	102,087	107,837
Depreciation	171,696	176,131
Total interest, other fixed charges and depreciation	$495,783	$506,968
Net income	$64,674	$6,583
Ratio of operating expenses to gross earnings	61.91%	65.29%
Ratio of operating expenses and taxes to gross earnings	69.16%	72.41%

L. J. Delamarter, vice-president and general manager of the company, says the full effect of the improvement expenditures was not realized during the year just closed, but that the changes will bring about savings in maintenance of track and equipment in the future and will better the service rendered car riders. Mr. Delamarter says that service to the public has been further improved by other expenditures made and new policies adopted such as:

1. Building loading platforms in congested districts.
2. Establishment of "Safety Zones."
3. Establishment of skip-stop operation on outbound cars during rush hours.
4. Establishment of "Pay-as-you-leave" cars on outbound traffic.

In addition, the experiment was tried of equipping a one-man double-truck car with the so-called "rear door control." The results obtained have been so satisfactory that the management is equipping other cars with this device.

The payment of the bonded indebtedness due June 1, 1924, was provided for through the sale of $3,200,000 of first mortgage 7 per cent sinking fund gold bonds due May 1, 1939, and $700,000 of twenty-year 7 per cent gold debenture bonds due May 1, 1944. Mr. Delamarter says that the financial position of the stockholders has been materially bettered as a result of this financing and with improvement in earnings, the directors will be enabled to work out a plan which will result in some distribution of income to the preferred stockholders. Just when this will take place, however, it is not possible to say definitely at present. The preferred stock is a 5 per cent cumulative issue. The amount outstanding is $2,000,000. Dividends are in arrears since Nov 1, 1918.

A review of the business conditions in Grand Rapids during the year 1923 shows a continued improvement in all lines.

Bus Merger Terms Announced

Details were announced on July 2 of the unification under a common management and control of the two largest motor bus operations in the United States. Under the proposed plan bus operation in New York and Chicago, so far as it is privately operated, will be put in the hands of a single organization. The controlling corporation will be known as the Omnibus Corporation. Provision will be made in its financial structure for future expansions of its field in other large cities of the United States and Canada.

In this deal the following companies are concerned: Fifth Avenue Bus Securities Corporation, New York Transportation Company, which owns the Fifth Avenue Coach Company, and the Chicago Motor Coach Corporation, which controls the Chicago Motor Coach Company and has a minority interest in the St. Louis Motor Coach Corporation, controlling the Peoples Motorbus Company, St. Louis.

An interesting feature of the unification plan is the intention declared on behalf of the new company by John A. Ritchie, president of the Chicago Motor Coach Company, and emphasized in the text of the plan of unification, to cooperate wherever possible with existing street railway lines and to supplement these and other transportation facilities. Illustrating this policy, the Chicago company now operates 335 buses over 85 miles of streets and parkways and by next September expects to operate 480 buses over 109 miles of routes, only 2½ miles of which are on streets occupied by surface railway lines. The New York company operates an average of 303 buses over approximately 25 miles of the city's main thoroughfare. The Chicago Corporation at present owns also a minority interest in the St. Louis Motor Coach Company. Negotiations are pending for the sale of this company as an entirety, presumably to interests representing the committee that is at work on the plans for the reorganization of the United Railways, St. Louis, the idea being to unify the operations of the two means of transport.

John Hertz, chairman of the board of the Chicago Motor Coach Corporation, and John A. Ritchie have agreed to serve as chairman of the board and president, respectively, of the Omnibus Corporation.

$20,105,707 Value Fixed at Denver—7½ per Cent Return

Special Master in Chancery Henry A. Dubbs on June 25 handed down his findings in the case of the city of Denver vs. the Denver Tramway. He holds the company is entitled to earn a net return of 7½ per cent. The city contended that the company was not entitled to earn more than 6 per cent net on its valuation. The value as placed by the special master is $20,105,707. The company claimed a valuation of $33,000,000, while the city contended the valuation was only $12.000,000. With regard to the fare to be charged, the master's report reads:

> I do not understand that it is for me to pass on the question as to what rates should be authorized during the receivership. That matter seems to me to be one for the court's general direction of the receivership, having in mind not only the value of the property, but the general administration of the trust, the conditions and demands of operation, and the probabilities of revenue.

Judge Dubbs fixed the valuation as per the following tabulation:

1. Land. etc.	$ 1,042,695
2. Track	4,896,176
3. Bridges, etc., (a)	25,711
Bridges (b)	785,252
4. Paving	1,273,044
5. Electric distribution system	999,347
6. Rolling Stock	3 951,283
7. Power station equipment	1,411,520
8. Substation equipment	249,412
9. Shop equipment, etc.	362,072
10. Buldings	2,356,000
11. Furniture, etc.	144,918
12. General stores	425 000
13. Working capital	200,000
14. Franchise cost	100,000
15. Engineering, etc., 5 per cent on foregoing, excluding 1, 3b, 11, 12, 13, 14	776,228
16. Administration, etc.	500,000
17. Taxes	275,000
18. Interest: 3.75 per cent on foregoing, excluding 1, 3b, 11, 12, 13, 14	1,664,889
19. Going value	1,500,000
Total	$22,938,547
Less depreciation—15 per cent on total, excluding land, general stores, working capital, franchise cost and going value.	2,832,840
Present value	$20,105,707

It is contended that the present fare, 8 cents, does not bring a return of 7½ per cent on a $20,000,000 investment, and it is also added that there is such a thing as raising the "price" so high that the end sought may be defeated. On this account it is not expected the company will seek to raise its fare beyond 8 cents, with two tokens for 15 cents.

Financial Writer Comments on Chicago Accomplishment

In his department, "The Investor," in the New York *Evening Post* for June 30, Paul Willard Garrett told the story of how Chicago, through a merger of all its rapid transit lines and a simplification of the capital structure, is now restoring traction credit. In his introduction Mr. Garrett said:

> For a traction company to improve its credit to such a degree that preferred stock can be sold to customers, although notes of the holding company have been in default for five years, is something of an achievement. It has been done in Chicago.

The details of the story of how this has been accomplished are not new to readers of the ELECTRIC RAILWAY JOURNAL, but Mr. Garrett put them all together in his story in so readable a way that the article, particularly since it is syndicated, ought to help toward a better understanding on the part of the general investor of what has been accomplished in Chicago and of the prospects apparently ahead of the company operating the rapid transit lines there.

More than 5,000 shares of preferred stock of the Chicago Rapid Transit Company have been sold to customer-riders up to June 30. A total of 13,326 shares were sold to employees prior to the time that the public was solicited to buy the securities. Under the original plan $1,000,000 of stock was set aside for the employees, but when the demand increased beyond the allotted amount, all restrictions were removed with the result that $1,332,600 of stock was purchased.

President Kurtz Frowns on Purchase Offer

Charles L. Kurtz, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, does not look very kindly upon the offer to the holders of the common stock of that company to dispose of their interest at $115 per share, made presumably in behalf of the Continental Gas & Electric Corporation. The purchase offer was made on behalf of Cyrus S. Eaton of Otis & Company, Cleveland, chairman of the Continental Gas & Electric Corporation.

Mr. Kurtz characterizes the plan to buy the stock as a "payment plan which, fairly stated, is contingent upon their ability to meet payments." Mr. Kurtz is reported to have said:

> Under foreign management the city had a breakdown in service, the stockholders had a cessation of dividends, and the property was allowed to deteriorate greatly. Home management has given the city service and the stockholders dividends, while the property has been thoroughly upbuilt. If the stock is worth more than $115 a share to capitalists or management corporations, it is worth more than $115 a share to present stockholders under home management.

Mr. Kurtz declared that within a very short time seven attempts had been made by foreign interests to buy control of the company, and that the board of directors recently refused important Eastern interests seeking control the right to examine the books of the company. He said that the board at that time was convinced the best interests of the city and stockholders would be served by a continuance of home ownership and home management. Mr. Kurtz said that he is the fourth largest personal holder of common stock of the company, and that he will not accept $115 a share. He says that in making this statement he is prompted by the desire to give stockholders the benefit of his own best judgment and to advise them of the action of the directors.

Mr. Eaton is said to have declared that the amount of stock named should be inclusive of what may have been already acquired, the amount of which he did not fix.

Fewer Passengers Being Carried in St. Louis

The United Railways, St. Louis, suffered a decrease of $95,501 in gross receipts, in May compared with the corresponding month in 1923. Exclusive of the Missouri Electric Railway, which operates between Wellston and St. Charles, the United Railways carried 24,388,642 passengers this year in May compared with 25,712,394 in May, 1923. Passenger revenue was $1,680,506 against $1,772,955 in May, 1923. It was the poorest May business since 1919.

For the first five months of this year the revenue from pay passengers was $148,655 less than for the similar period in 1923. The totals are $8,611,203 in 1924 and $8,462,548 this year.

The May decrease is attributed to unemployment, general business depression, bad weather and bus competition. However, the buses took fewer passengers from the railway in May than in previous months, due to it being impossible for bus riders to use the upper decks in bad weather.

The drop in passengers carried occurred mainly on lines serving large employment centers.

$6,300,000 of 7 per Cent Issue Offered at Par.—A syndicate including E. H. Rollins & Sons, Marshall Field, Glore, Ward & Company, H. M. Byllesby & Company, Inc., and Janney & Company, New York, offered for subscription on July 1 at 100 and accrued interest $6,300,000 of thirty-year 7 per cent sinking fund secured gold notes of the North American Light & Power Corporation. It is explained that the North American Light & Power Corporation, organized under the laws of Delaware, will control the Illinois Power & Light Corporation and the Missouri Power & Light Company, which serve a population of about 1,250,000 in more than 350 municipalities in Illinois, Iowa, Missouri, Kansas, Ohio and Oklahoma. The North American Light & Power Company will own all the common stock of the North American Light & Power Corporation. About three-quarters of the net earnings are derived from power and light. The railway properties consist of 540 miles of trunk line 248 miles of track within city limits.

Seeks to Abandon Line.—The Geneva, Seneca Falls & Auburn Railroad, Geneva, N. Y., has filed an application with the Public Service Commission for permission to abandon its route on Pultney Street in Geneva.

Receivership Petition Filed.—A petition for receivership has been filed in the Supreme Judicial Court of Massachusetts against the Milford, Attleboro & Woonsocket Street Railway by Augustus G. Bullock and others, trustees of the New England Investment & Security Company. The petitioners allege that the road is in debt to the extent of $19,198 and that they hold $350,000 in stock and $56,000 in 5 per cent gold bonds of the company, as well as notes amounting to more than $40,000. The road is 30 miles long. It runs through Blackstone, Mendon, Hopedale, Milford, Franklin, Wrentham and Plainville.

Line Bought.—The Towson & Cockeysville Electric Railway, Towson, Md., which operates a line with a storage battery between Towson and Timonium, Md., a distance of 3 miles, and which has been abandoned, was bought by the Boston Iron & Metal Company of Baltimore, for $9,710. It is reported that it will probably be torn up and the material disposed of by the new owners.

May Take Over Line. — The New Brunswick Power Company, St. John, N. B., may take over the Valley Railway, extending from Westfield to Centreville in New Brunswick, a distance of 150 miles, and change from a steam railroad to an electric railroad. Originally this line was to have been an electric line. However, it was eventually converted into a steam railroad and handed over to the Canadian National Railways system for operation. The latter system has not been operating the line successfully and is not anxious to continue.

Decrease in Passengers Carried.—For the month of May, 1924, the City of Detroit Department of Street Railways had a total revenue from transportation of $1,842,039 against $1,762,166 in May, 1923. The total operating revenue which included the above mentioned amounts was $1,887,077 and $1,852,154 respectively. Total operating expenses differed slightly being $1,352,793 in May of this year and $1,352,338 in May a year ago. The net income showed a falling off from $73,115 in May, 1923 and $67,107 in May, 1924. Total passengers carried also showed a decrease. In May, 1923, the number totaled 43,391,267 and in May, 1924, the number of passengers carried was 39,578,651.

Montreal Tramways & Power Deal Pending.—Two sections of the board of directors of the Montreal Tramways & Power Company, Montreal, Que., are fighting for control of the company. One section, headed by Senator Webster, wants to pass the concern on to a new company named the United Securities, financially sponsored by the Montreal Power Consolidate and Shawinigan Water & Power. These interests already control the Montreal Public Service, hitherto one of the Tramways & Power group. The section headed by President Beauvais is fighting for better terms. Shareholders are given until Aug. 1 to deposit their stock with the Montreal Trust Company. They are offered $15 of stock in United Securities, half common and half preferred, the latter with a guaranteed 6 per cent dividend. Mr. Beauvais claims it is worth $20 to $25 cash. The Montreal Tramways & Power Company controls the Montreal Tramways through its ownership of slightly more than half the stock of that company.

Middletown City Trolleys Abandoned.—The Public Service Commission has approved the petition of the Walkill Transit Company to abandon its entire route in the city of Middletown, N. Y. It was brought out that the city officials had requested the abandonment in order to accommodate increasing vehicular traffic in the narrow streets. A few weeks ago the company was granted a certificate for the operation of bus lines in the city of Middletown to replace the trolleys. The electric railway route between Middletown and Goshen will not be abandoned. Passengers will be conveyed by bus to and from the city limits of Middletown where the electric car may be boarded.

Preferred Stock Sale Authorized.—The Milwaukee Northern Railway, Cedarburg, Wis., has been granted permission by the Railroad Commission to sell a preferred stock issue of $200,000. The proceeds will be used to finance additions and extensions to the company's lines.

Ceases Operation.—The Adrian Street Railway, Adrian, Mich., ceased operating on June 28 through an agreement between Henry L. Doherty & Company and the City Council. The line has been operated for a number of years for the purpose of providing a terminal for the Toledo & Western interurban line. It has not made a profit in recent years. Some months ago the Doherty interests acquired the power properties in Adrian and have tied them in with the Toledo Suburban Electric Company, which serves towns along the Toledo & Western Railroad.

Successor to Buffalo-Lake Erie Line Chartered.—A certificate of incorporation was filed on July 1 in the office of the Secretary of State of New York for the Buffalo & Erie Railway capitalized at 7,005 shares preferred stock $100 par value and 30,000 shares common stock of no par value. The corporation is apparently formed to take over a considerable portion of the properties of the Buffalo & Lake Erie Traction Company, the plan for the reorganization of which was recently declared operative. The charter of the new company is broader in its provisions than was the old one. It is so drawn that the company may operate buses or other vehicles.

Bond Issues Authorized.—The Indiana Public Service Commission has authorized the Interstate Public Service Company, Indianapolis, Ind., to issue $151,700 of 6 per cent bonds to reimburse its treasury for capital additions. The company asked permission also to issue $79,400 of preferred, common or prior lien stock, but the commission did not grant this request because, the order said, of lack of sufficient information concerning what the issue would cover. The Union Traction Company, Anderson, Ind., was authorized to issue $222,000 of 7 per cent notes, $400,000 of 6 per cent notes, and $1,000,000 of 6 per cent bonds. Seven hundred thousand dollars of the bonds are pledged as collateral for the $622,000 of notes and the other $300,000 is to remain in the company's treasury.

Dividend Action Deferred by Interurban.—At a meeting of the directors of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., on June 27 it was decided to defer until a later date any action on dividends on the company's preferred stock for the quarter ending June 30. The dividend has not been earned for the first six months of the year because of the increased cost of operation, especially increases in wages to employees. The company has been granted an increase in rates. It was stated that this will place the rates more nearly on a parity with those of the steam roads. The directors believed that no declaration of dividend should be made until the effect of any new rates had been determined.

Preferred Stock to Be Advanced in Price.—The 7 per cent preferred stock of the Illinois Power & Light Corporation, Peoria, Ill., which has been selling at $95 a share will be increased to $96.50 a share after midnight of July 31. This fact was announced recently by E. Paul Young, head of the investment department. The stock at the new price will yield 7.25 per cent. The news of the rise in price is of interest to more than 13,000 stockholders, who have purchased it during the last eight months under customer ownership.

Legal Notes

FEDERAL COURT—*Payment of Accumulated Dividends Held Not Subject to Mandamus.*

Under the plan of reorganization of the Chicago Railways, a series of participating certificates was issued, entitling the holders to 8 per cent cumulative dividends. These were paid up to 1917, but then were discontinued. It was shown that the company had accumulated a surplus over prior charges of $1,928,000 and certain holders of the participation certificates brought suit to compel the payment of dividends, which the defendants had not paid out because of their contention that a large surplus was necessary for the protection of all parties concerned. The court held that in this case it could not issue an order opposed to the judgment of the board of directors, the finance committee, and the stockholders of the company, in the absence of bad faith or abuse of discretion on their part. [Thatcher et al vs. Chicago Railways et al, 297 Federal Rep., 466.]

FEDERAL COURT—*Validity Upheld of Proviso on Ticket Limiting Carrier's Liability for Safe Carriage to His Own Line.*

A passenger purchased a round-trip ticket covering three lines and was injured on one of those from which he did not purchase the ticket. He instituted suit against the seller of the ticket, although the ticket carried the notice "In selling this ticket and checking baggage hereon, the selling carrier acts only as agent and is not responsible beyond his own lines." The Supreme Court held that it was not responsible and reversed the decision of the Supreme Court of Arkansas. [Missouri-Pacific Railroad vs. Prude, 44 Supreme Ct. Rep., 450.]

NEW JERSEY—*Definition for an Interurban Road of Business "Within a State."*

The New Jersey franchise tax law requires every street railway corporation to report its gross earnings within the state, and it then has to pay a tax upon such proportion of its gross receipts as its length of line in New Jersey compares to the length of its whole line. The Phillipsburg Transit Company operates a line in New Jersey and some of its cars cross an interstate bridge, then use for about two blocks track belonging to the Easton Transit Company. This latter company owns all the capital stock of the Phillipsburg Company and the latter has no franchise in Pennsylvania. Prior to Jan. 1, 1920, the New Jersey company operated its cars to the terminal in Easton on a rental basis. Following that date, the rental was given up and the Easton company took all of the eastbound fares in lieu of rental. The court declared the Phillipsburg Transit Company must include all such fares in its return to the State Board of Taxes. [Phillipsburg Transit Co. vs. State Board of Taxes and Assessments, 124 Atlantic Rep., 122.]

PENNSYLVANIA.—*Physical Examination Justified.*

In an action for personal injuries, after the trial and pending a motion for a new trial, the court did not err in ordering a physical examination of the plaintiff by a disinterested physician, where the trial judge was satisfied that the extent of the plaintiff's injuries had been thoroughly examined by two physicians who testified for her and by three who testified in behalf of the defendant. Where there is no evidence of concealment from physicians in examination, the matter of allowing further physical examination after trial is within the discretion of the trial court. [Schroth vs. Philadelphia Rapid Transit Co., 124 Atlantic Rep., 279.]

TEXAS—*Storm Sewer Not a "Street Improvement" Assessable Against a Street Railway.*

The city charter of Dallas, when defining street improvements, requires street railways to pay the cost of such improvements between and for 2 ft. on each side of its rails. The court held that a storm sewer under its track, from which it receives no special benefit but rather detriment did not come within the definition of the improvements, for which the company could be required to pay. [Dallas Consolidated Electric Street Railway et al. vs. City of Dallas et al., 260 Southwest Rep., 1035.]

Personal Items

Ross Schram Made Manager at Detroit

Ross Schram, former assistant general manager of the Detroit Department of Street Railways, has been appointed general manager of the municipal system, succeeding William B. Mayo, who relinquished his duties as general manager on June 27, to take a consulting engineer's post in the department.

Temporary appointments made by Mr. Schram to hold until the Street Railway Commission meets to decide upon and confirm the final organization include: H. M. Gould, electrical engineer of the Detroit Street Railway, to be acting assistant general manager and I. N. Merritt, auditor, to be acting secretary to the Street Railway Commission, succeeding Mr. Schram, who also held that position in addition to being assistant general manager.

It was announced that the commission's action in declaring the general manager's office vacant and appointing Ross Schram general manager was taken with the consent and counsel of Mr. Mayo whose duties with the Ford Motor Company prevent him from spending the time required as manager of the Detroit Street Railway. Mr. Mayo felt that to Mr. Schram should go responsibility for the position and full credit for the work. The new appointments have been aproved by acting Mayor Joseph A. Martin. Mr. Schram's salary in the new post will be $15,000 a year. He formerly received $9,000.

Changes in Personnel Announced in Boston

Several changes in personnel on the Boston Elevated Railway, Boston, Mass., became effective on July 1, 1924. They are as follows:

John A. Smith transferred from assistant to superintendent of transportation to the assistant to supervisor of timetables.

E. A. Kelley transferred from superintendent of Division 2 to assistant to superintendent of transportation.

A. W. Senter transferred from superintendent of Division 4 to superintendent of Division 2.

A. S. Scott advanced from supervisor to superintendent of Division 4.

Charles A. Bauch advanced from supervisor to superintendent of Division 1 on account of the death of C. J. Leonard.

John R. Guilliams, for years general attorney in charge of the legal and accident investigation department of the Chicago Surface Lines, has been elevated to the position of general counsel for the organization. The announcement was made by Henry A. Blair, president. Mr. Guilliams will succeed the late William Wirt Gurley, who was general counsel at the time of his death. Mr. Guilliams was formerly connected with the legal department of the Chicago & Northwestern Railway and was later trial attorney of the Chicago Consolidated Traction Company. Upon the consolidation of the north and west side lines as the Chicago Railways he served as general attorney for that corporation.

Major Burpee Promoted

Popular Canadian Electric Railway Executive Made Vice-President of Ottawa Electric Railway

"Ottawa can point with pride to the new vice-president of the Ottawa Electric Railway as a native son, for Frederick deMille Burpee was born in the Capital city on April 25, 1876."

These are the words that were used by the Ottawa *Citizen* in announcing to its readers Mr. Burpee's recent advancement with the company. Naturally the *Citizen* saw Mr. Burpee first of all as an important local personage. But he is more that that. Mr. Burpee is really one of the outstanding figures among electric railway operating men in Canada, and is more than fairly well-known in public utility circles in the United States for his able handling of affairs in Ottawa.

F. D. Burpee

Like many other electric railway operating officials, Mr. Burpee has had to contend with all the war-time and post-war time complications, but in addition to this, during part of 1921 he had to battle somewhat stubborn agitation for municipal ownership. This agitation culminated in a popular vote, but so well did Mr. Burpee and his associates do their work that the proposal was defeated. In Canada, of course, municipal ownership is always impending somewhere or other. Had municipal ownership been brought about in Ottawa Mr. Burpee would undoubtedly have continued to run the road, that is, if he could have been induced to do so, for Ottawa had no idea of losing him, agitation for his intention being started long in advance of the taking of the vote.

These facts regarding Mr. Burpee are set down not for the mere pleasure of indulging in idle speculation about something that did not happen, but to show the popularity of the man with the public and the esteem in which he is held locally for his operating ability. His rapid rise with the local company attests to the appreciation of his talent by his immediate business associates.

The matter-of-fact record of Mr. Burpee's career shows that he received his education in the Ottawa public and normal schools, and at his father's death, which occurred when he was only fifteen years of age, he started out on the business career. In 1912 he succeeded Col. Hutcheson as superintendent of the Ottawa Electric Railway. After his overseas service he returned to the post and on March 20, 1920, was appointed general manager.

In February, 1922, Major Burpee became a director of the Ottawa Traction Company, Ltd., which is the holding company and the owner of the stock of the Ottawa Electric Railway. These two positions Major Burpee held up to the time of the death of the late Warren Y. Soper.

In January, 1923, Major Burpee was one of the promoters of the Auditorium Limited, of which company he was electer president, an office which he still holds. He is a past-president of the Ottawa Rotary Club, of which he is a very active member. He is also past-president of the Canadian Electric Railway Association. He is keenly interested in athletics.

Grover A. Whalen has resigned as commissioner of plant and structures of New York City under Mayor Hylan to become assistant to Rodman Wanamaker, president of the John Wanamaker merchandising organization. Mr. Whalen made a great reputation for himself as a city employee not only for his affability, but also for the rare ability which he displayed in handling matters that came under his jurisdiction. As part of his city work he was in charge of the municipal railway on Staten Island and directed the operation of the city's shuttle line on the Williamsburg Bridge. Buses operated under city auspices were also under his direction. Even those who disagreed with some of Mr. Whalen's methods recognized in him a man of unusual capabilities.

A. F. Campbell has been appointed supervisor of stores for the entire system of properties of the Illinois Power & Light Corporation, Peoria, Ill. His headquarters will be at Decatur, Ill. Mr. Campbell has been in charge of stores of the Illinois Traction System, a subsidiary of the Illinois Power & Light Corporation with offices at Decatur, Ill. He was formerly for twelve years with the Santa Fe Railroad. The office, which is a new one created by the company, is effective July 1. It will be under the supervision of the general operating engineer of the power company.

H. J. Hoffman has been promoted to the position of general auditor for the San Francisco, Napa & Calistoga Railway, with headquarters at Napa, Cal., vice F. H. Groat, who resigned effective July 1, to enter business for himself. Mr. Groat had been with the company in the capacity of general auditor for six years.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Exhibits Do Pay

By J. C. McQuiston

Chairman Exhibit Committee,
American Electric Railway Association

Do exhibits pay? This question is asked as regularly as the years roll by. Many doubt whether much if any benefit is derived; yet the progressive manufacturer is always found among the exhibitors.

Exhibits, after all, are real advertisements. Generally the manufacturer shows his product, and many times the apparatus is displayed in motion. This is the best kind of an advertisement, because it is alive, it is actual, it is real. In order that we may really give fair consideration to the "worth-whileness" of the mass of exhibits, let us imagine a situation extending over a period of five years, in this progressive age, in which there would be no exhibits of any kind.

Exhibits Are Stimulating

From the standpoint of progress in industry, there can be little doubt that the result would be a tremendous slowing down of advancement along the lines of applications of new and improved methods of carrying on the world's work. The absence of stimulating influences that are generated at great exhibitions would certainly have a negative effect on modernizing the ways and means of carrying on our commercial activities.

Suppose we hark back to the days when exhibits were rare; or even to the days when exhibits were confined to the great national exhibits like the Centennial, World's Fair and the Panama-Pacific Exposition. The manufacturer who had a new and wonderful device to bring to the attention of the railroad operators of the country was then compelled to carry his device on a car or on cars to all parts of the country. In other words, he was compelled to set up a separate and special exhibit on the premises of the prospective users. Such a plan, requiring an itinerary all over the country, involved a tremendous outlay of money, and, furthermore, only those who made apparatus of most ususual importance and costing a large amount of money could afford to resort to such a plan.

Now consider the wonderful opportunity afforded by such exhibitions as those provided by the American Electric Railway Association, the National Electric Light Association, the American Railway Association, and others of similar importance. These exhibits, which parallel the conventions of these associations, make it possible at least once a year for all who are interested in the use of improved machinery and in improved methods of bringing about the best service with greatest economy to review all the new and improved appliances and become familiar with anything and everything that a year of progress in invention and development have made available. No one can tell what this is worth to the world's business, and even the discontinuance of these exhibits would not reveal the real loss to the progress of the world—at least not for many years.

Exhibits and advertising are necessary. These activities are progressive, and those identified with the worthwhile businesses are those who carry their business message in properly selected advertising media and exhibit their products at the exhibitions that reach their trade or business, as well as the general public.

Trackless Trolley Corporation to Manufacture in New York

The Trackless Trolley Company of America, New York City, has filed a certificate of dissolution in the office of the Secretary of State at Albany.

The Trackless Trolley Corporation, Wilmington, Del., Charles Berg president, has filed its duplicate certificate at Albany and will enter New York State to manufacture these vehicles, with offices at 501 Fifth Avenue, New York City. J. C. Rowe, 30 Church Street, is attorney for the corporation.

The capital is stated as 10,250 shares preferred stock, $100 par value ($1,025,000), and 21,000 shares common stock, non-par value.

$85,000,000 for Roadway Improvements

Estimates received by Electric Railway Journal during the first six months of the year covering the amount of money to be spent by railways in the United States and Canada during the current construction season on track and roadway improvements total approximately $85,000,000. About 1,140 miles of single track are involved in the jobs covered by these estimates. Paving in excess of 2,500,000 sq.yd. will be required. Track built or rebuilt by the electric railways in 1923 totaled about 1,114 single-track miles. Thus it will be seen that the mileage of the reconstruction work included in the estimates received from Jan. 1 to June 30, 1924, are greater by about 25 miles than those for the entire year of 1923. In explanation of this it may be said that in a number of cases the figures include work which it will require several years to complete and that the entire mileage should therefore not be credited to the first six months of the current year. On the other hand detailed information is not yet available on a number of large jobs which have actually been undertaken and the total figures for the year may therefore be safely assumed to be nearly double those for last year. Details of the various jobs were given in 126 news items which have appeared in the Journal between Jan. 5 and June 28 this year.

Several subway projects, the actual undertaking of which is still somewhat problematical, have been omitted.

ELECTRIC RAILWAY MATERIAL PRICES—JULY 2, 1924

Metals—New York

Copper, electrolytic, cents per lb.	12.50
Lead, cents per lb.	7.00
Nickel, cents per lb.	27.00
Zinc, cents per lb.	6.15
Tin, Straits, cents per lb.	43.625
Aluminum, 98 to 99 per cent, cents per lb.	27.50
Babbitt metal, warehouse, cents per lb.:	
Fair grade	60.00
Commercial	28.00

Bituminous Coal

Smokeless mine run, f.o.b vessel, Hampton Roads	$4.325
Somerset mine run, Boston	2.175
Pittsburgh mine run, Pittsburgh	1.875
Franklin, Ill., screenings, Chicago	1.825
Central, Ill., screenings, Chicago	1.675
Kansas screenings, Kansas City	2.50

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	2.90
Tie plates (flat type), cents per lb.	2.52
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.00
Steel bars, cents per lb.	2.15
Ties, white oak, Chicago, 6 in. x 8 in. x 8½ ft.	$1.70

Hardware—Pittsburgh

Wire nails, base per keg	2.90
Sheet iron (28 gage), cents per lb.	3.50
Sheet iron, galvanized (28 gage), cents per lb.	4.60
Galvanized barbed wire, cents per lb.	3.70
Galvanized wire, ordinary, cents per lb.	2.65

Waste—New York

Waste, wool, cents per lb.	15
Waste, cotton (100 lb. bale), cents per lb.:	
White	12–18
Colored	9–14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$0.99
White lead (100 lb. keg), cents per lb.	11.75
Turpentine (bbl. lots), per gal.	$0.84
Car window glass (single strength), first three brackets, A quality, discount*	84.0%
Car window glass (single strength), first three brackets, B quality, discount*	86.0%
Car window glass (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	15.25
Rubber-covered wire, No. 14, per 1,000 ft.	$6.25
Weatherproof wire base, cents per lb.	17.25

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq.yd.	$3.60
Common, per sq.yd.	2.95
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.48
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	53–54
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f.o.b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.00
Light copper, cents per lb.	8.25
Heavy brass, cents per lb.	5.75
Zinc, old scrap, cents per lb.	3.50
Light brass, cents per lb.	4.75
Lead, cents per lb. (heavy)	6.00
Steel car axles, Chicago, net ton	$16.75
Cast iron car wheels, Chicago, gross ton	16.25
Rails (short), Chicago, gross ton	16.75
Rails, (relaying), Chicago, gross ton	26.50
Machine turnings, Chicago, gross ton	7.75

Rolling Stock

Toledo & Indiana Railroad, Toledo, Ohio, has placed an order for seven new cars with the Cincinnati Car Company. Delivery on the cars is expected about Oct. 1. The new cars will be of lighter construction than present equipment on the road and will enable considerable increase and betterment to service. They will weigh 16 tons, seat 50 passengers, and be equipped with four 35-hp. motors.

South New Orleans Light & Traction Company, Algiers, La., suffered the loss of four cars by fire when the shops were struck by lightning on June 27.

United Railways, St. Louis, Mo., through general manager Perkins for Receiver Wells will ask permission of the court to build fifty cars in its own shops of the 700 type of front-entrance-side-door delivery cars. Several months ago the court turned down a request for 100 of these cars.

Morris County Traction Company, Morristown, N. J., has ordered ten of the latest type safety cars at a cost of $12,000 each. The cars are now being built by the Osgood Bradley Car Company at Worcester, Mass.

Boston Elevated Railway, Boston, Mass., has recently placed an order for fifty more one-man, two-man cars. This will make a total of 355 cars of this latest Boston standard type. Of these new cars twenty-five will be built by Brill and twenty-five by the Laconia Car Company.

Track and Line

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., is planning improvements to its line en route to Gulfport, Biloxi and Pass Christian. The work will include the laying of 75-lb. steel rails.

Wilkes - Barre Railway, Wilkes - Barre, Pa. has been ordered by the Public Service Commission to extend its tracks to the main line tracks of the Central Railroad of New Jersey in Wilkes-Barre township, a distance of about 3,600 ft. from its present terminus.

New York State Railways, Syracuse, N. Y., plans to pave Spring Street at a cost of $35,000; also new loop at end of Irving Avenue at a cost of $10,000.

Seattle Municipal Railway, Seattle, Wash., may relocate and reconstruct a considerable portion of the Fauntleroy car line, at an estimated cost of $65,800 if a bill introduced in the City Council and referred to the city finance committee is passed. It is also proposed to reconstruct and relocate a portion of the Lake Burien line.

Omaha & Council Bluffs Street Railway, Omaha, Neb., will reconstruct practically a mile of tracks in Council Bluffs, Iowa, at a cost of $46,678. The tracks on Pierce Street from First to Oak and on Fifth Avenue, Main to Fourteenth Street, are to be relaid, at an estimated cost of $45,700. Tracks over the Milwaukee Railroad tracks at Sixteenth and Main Streets and the Wabash tracks at Tenth Street are also to be repaired.

Cincinnati, Ohio. — The Cincinnati Rapid Transit Commission has awarded to Hickey Brothers, Cincinnati contractors, the contract for the construction of the subway and rapid transit system from Mitchell Avenue to Oakley. This new route of approximately 5.3 miles is the connecting link of the rapid transit system. The award was made on their bid of $1,089,000. It is $42,400 above the estimate.

Arkansas Central Power Company, Little Rock, Ark., recently began the work of installing new curves at Capitol Avenue and Main Streets, to permit the turning of north-bound cars from Main Street into West Capitol Avenue. The new curves will allow the combining of the East Ninth and the East Fourteenth lines with the Highland and South Highland lines, to make two through cross-town lines. The cost of the work is estimated at $25,000. The company recently installed new curves and tracks on Victory and West Third Streets, at a cost of 10,000, to combine the Pulaski Heights and South Main car lines into one through line.

Oklahoma Railway, Oklahoma City, Okla., will join with the State of Oklahoma in the construction of an underpass under the tracks of the Oklahoma Railway on the Oklahoma City-Norman hard-surfaced highway now being constructed about one and one-half miles north of the railway station at Moore. The railway will at its own expense construct the culvert under its tracks, excavate for its footings, build and complete the abutments and bridge, and build a temporary track to be used for operation during construction of the underpass. The state is to do all other excavating and grading with the exception of back-filling beyond abutments and making necessary cuttings for the drainage culvert which the railway company is to build. The state highway department is to do all other work not specified and will pay the railway company $7,000 to represent the state's share of cost of construction.

Union Traction Company, Anderson, Ind., will spend $222,000 on betterments, including the extension of the freight station and tracks in Anderson.

Power Houses, Shops and Buildings

United Railways & Electric Company, Baltimore, Md., plans to build a one-story brick substation at Caroline and Fairmount Avenues. The contract has been let to DeCou & Davis at a cost of $25,000.

Northern Ohio Traction & Light Company, Akron, Ohio, plans to construct a fireproof substation at Gorge power plant at a cost of $40,000.

Citizens Traction Company, Oil City, Pa., has engaged the firm of Day & Zimmerman, Philadelphia, to prepare plans and specifications for doubling the present capacity of its West End power plant in Oil City. A 500-hp. boiler has been ordered and a 7,500-kw. turbine will be purchased.

Trade Notes

Ben W. Buyer, Jr., formerly sales engineer with the Union Special Machine Company, Chicago, is now with the New York branch office of the Industrial Works, Bay City, Mich., as district sales engineer.

Gisholt Machine Company, Madison, Wis., has purchased the business of the Millholland Machine Company, Indianapolis, Ind., including its stock of finished machines, the parts in process, good will, trade marks, patents, patterns, drawings, jigs, tools and fixtures. It will continue at Madison the manufacture and sale of Millholland machines, which have gained an enviable reputation throughout the manufacturing world. The syndicate of firms owning the Millholland Machine Company of Indianapolis having passed through a receivership the latter company was forced to liquidate.

Rome Wire Company, Rome, N. Y., announces the opening of a sales office with a complete warehouse stock of its products at 1200 West Ninth Street, Cleveland. C. R. Evans, district manager will be in charge.

Conveyors Corporation of America, Chicago, Ill., has received an order from the Cleveland, Cincinnati, Chicago & St. Louis Railway for an American steam jet cinder conveyor for the power plant of the shops at Indianapolis. The new conveyor system is designed to handle cinders from four boilers in the plant, the cinders being discharged into an overhead bunker, holding approximately 25 tons of refuse. When the bunker is filled, a car is spotted on the side track below and the cinders withdrawn. This order is one of a number recently secured from the railroad field.

New Advertising Literature

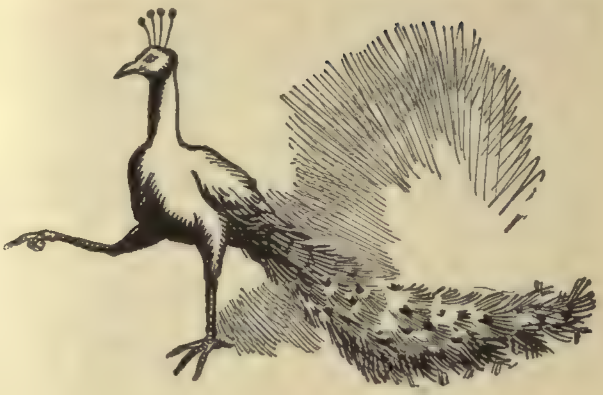
Condit Electrical Manufacturing Company, South Boston, Mass., has issued a folder giving the principles of oil circuit breaker construction.

Thompson Electric Company, Cleveland, Ohio, has issued catalog B-20, describing the new Underslung model of safety disconnecting hangers enabling high lamps to be lowered "away from" the electric circuit for cleaning and renewals.

Quigley Furnace Specialties Company, New York, N. Y., has issued a new bulletin entitled "Hytempite in the Power Plant." This bulletin illustrates some of the successful applications of Hytempite in refractory construction.

Superheater Company, New York, N. Y., has published "Origin, Development, Results of Elesco." The booklet gives in brief form the history of the Superheater Company and the growth of its operations up to the present time. The development of the use of high degree superheated steam is traced from the earliest experiments of the late Dr. Wilhelm Schmidt of Cassel, Germany, to the present tendencies in steam generation in this country. An interesting paragraph explains the origin of the trade name "Elesco" applied to the products of that company.

Get the benefit of adequate protection and less maintenance!



Even for the larger cars, Peacock Staffless Brakes have a braking power equivalent to the air brake equipment. This means ability to stop the loaded car on heavy grades if emergency requires. It isn't every so-called hand brake which will do it.

Add to that the fact that Peacock Staffless brakes have practically no maintenance requirements. Graphite bronze bushings have eliminated the need for oiling, making a brake which will almost last forever.

Peacock Staffless Brakes

Figure the investment value of Peacock Staffless Brakes on your next car order.

National Brake Co., Inc.
890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative
Lyman Tube & Supply Company, Limited, Montreal, Canada

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Specializing in Utility Rate Cases and
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Allison Bldg. Richmond, Va.
Established Feb. 1913.

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Consultant on Fares and Motor Buses
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
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Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
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Engineer—2301 Connecticut Ave., N. W. Washington, D.C.
TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
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Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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DAY & ZIMMERMANN, Inc.
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Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

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Railway Audit and Inspection Company, Inc.
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THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK
Street Railway Inspection DETECTIVES
131 State St. BOSTON

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

For all welding use in this big shop

The New York, Ontario and Western Railroad has standardized on Super Service Welding Cable throughout their entire shop. Work speeded up because Super Service Cable does not kink, curl, or tangle, but lies flat and coils easily. It will not pick up dirt or absorb moisture, has no wax to melt and cause sticky, clumsy handling.

Vulcanized in steel molds under tons of pressure, Super Service Welding Cable has a heavy, dense insulation, which prevents shocks or breakdowns and eliminates costly delays in rushed repair jobs. Its high safety factor increases the efficiency of operators, its smoothness and flexibility increases the speed of the work.

Send for a sample and use it for making your own tests.

Super Service Cord and Cable is made in a variety of sizes and types for railroad work—from portable lamp cords to the heaviest welding cables.

Write to Dept. B-2

ROME WIRE CO. *Mills and Executive Offices:* ROME, N. Y.
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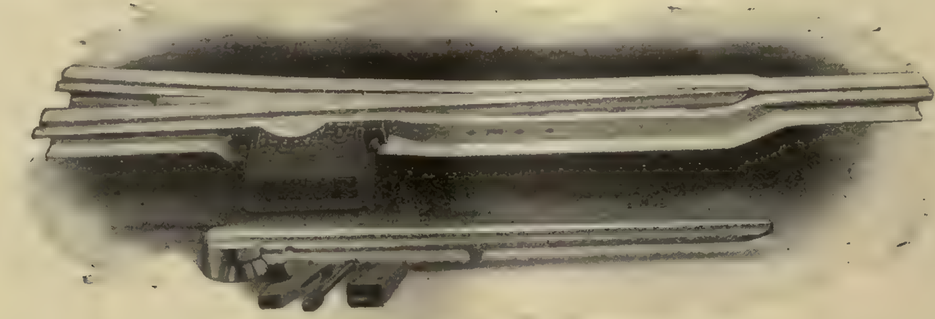
LOS ANGELES, J. G. Pomeroy, 336 Azusa Street

2179-L

ROME WIRE
WIRE-ROME

Track Recommendations for 1924

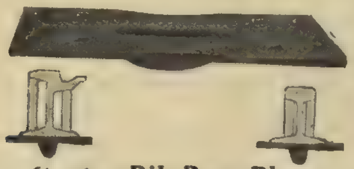


Solid Manganese Tongue Switch, Design 905

This switch is of the improved "Big Pin" type, providing maximum bearing surface or support at the heel. The positive action of hold-down block resists any tendency of the tongue to rock under side thrust, or kick up at the point due to the pounding action of car wheels. The extra large box at the heel of the tongue provides ample room for easy adjustment and quick cleaning.

Hard Center Mate, Iron Bound Type, Design 923

The mate illustrated above is provided with a heavy manganese steel wearing plate three inches thick held firmly to the carefully machined bed of the mate body by heavy stud bolts of heat-treated Mayari chrome-nickel steel. The entire construction is unusually heavy and substantial.

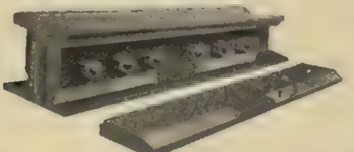


Center Rib Base Place

This design provides the maximum stiffening reinforcement directly under the rail joint. It supports the joint and prevents battering or cupping of the rail ends.

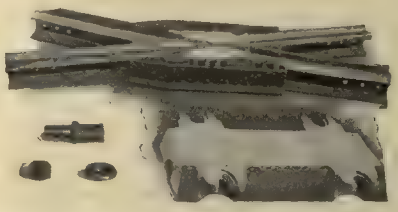
Abbot Base Plate

This plate serves the same purpose as the Center Rib. In this case the reinforcement is on each side instead of in the center.



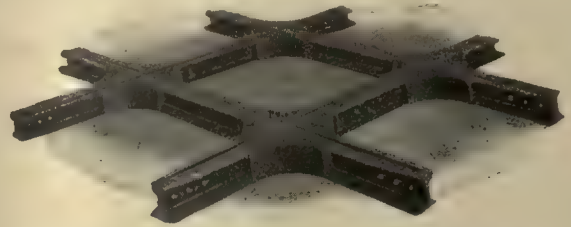
Machine Fitted Joint, Design 983

Joint illustrated above is accurately machined top and bottom to fit any rail section. The special bevel top and bottom is provided for electric arc welding.



Hard Center Frog, Iron Bound Type, Design 942

This hard center frog is of the same construction and offers the same advantages as the mate described above. Particular attention is called to the large bearing area of the plate.



Rolled Steel Alloy Crossing, Design 960

This rolled steel crossing is made of a special rolled Mayari chrome-nickel steel rail. The head of the rail is rolled full, the flangeways machined to any desired depth and then heat-treated to withstand wear. The rails are iron-bound into one solid piece, flange bearing throughout. This crossing may be welded after wear has developed

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

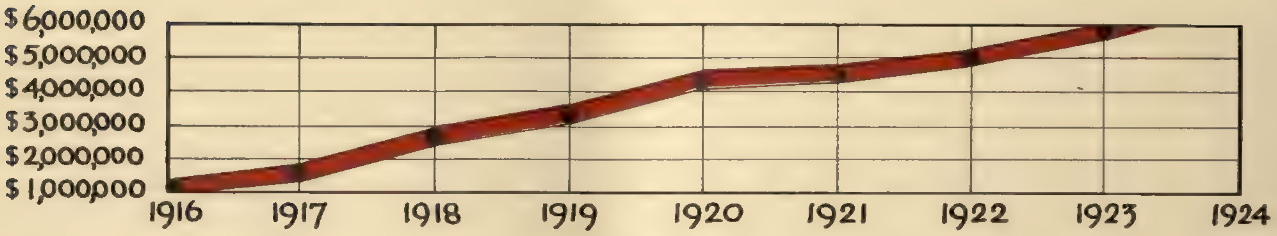
Earnings respond to modernization

Financial Statement—

of an electric railroad which
has met post war conditions
with war-like energy and methods—

An Increasingly Favorable

A Phenomenal record of growth



Policies that have carried the *North Shore Line* forward—

"SERVICE to the Public" is the motto of the Chicago North Shore and Milwaukee Railroad.

So successful has that policy proved in the last eight years that the property has been under the present Management, that the North Shore Line today occupies an outstanding position among the electric railroads of the country.

Winner of the first Charles A. Coffin Gold Medal in 1923, in recognition of the distinguished contribution it has made toward popularizing electric railway service, the North Shore Line is today "the most talked about" electric railroad in the country.

In awarding the company the Coffin Medal, the committee of the American Electric Railway Association in its report said: *"The committee finds that on this property there has been carried to fruition most of the things that have been talked about for years as the remedies for various troubles. On this property the remedies have not only been talked about; they have been executed."*

Success Shown in Phenomenal Growth and Steady Increase in Revenue

The popularity of the North Shore Line is seen in the figures showing the phenomenal growth and steady increase in its revenue. In 1916, the year in which the road was brought under the present Management, its gross revenue was $1,157,191. In 1923 it was $5,945,272. The revenue passengers carried in 1916 numbered 7,459,659. In 1923 they numbered 16,146,802. In 1916 the Merchandise Despatch tonnage was 19,891 tons and the revenue $62,654. In 1923 the tonnage was 445,848 tons and the revenue $1,033,479.

Public Confidence and Goodwill Seen in Successful Sale of Stock

Further evidence of the popularity of the North Shore Line in the communities which it serves, is seen in the recent successful sale of $1,500,000 7% prior lien stock at par to its customers and employes. Seventy per cent of the employes of the company subscribed for this stock and among the customers the subscribers numbered more than 4,000. The sale was effected entirely by the employes of the company. No professional salesmen were employed. The stock found ready purchasers among those who know the road intimately through their daily use of its service.

CHICAGO NORTH SHORE & MIL

Investment Opportunity

Comparative Income Statement for the Years 1916 to 1923

	1916	1917	1918	1919	1920	1921	1922	1923
Operating Revenue	$1,157,191	$1,751,373	$2,899,975	$3,237,921	$4,193,669	$4,500,805	$5,007,951	$5,945,272
Operating Expenses	714,887	1,114,512	1,856,038	2,319,464	3,229,048	3,440,761	3,777,592	4,464,421
Net Revenue—Railway Operation.	442,304	636,861	1,043,937	918,457	964,621	1,060,044	1,230,359	1,480,851
Net Auxiliary Operating Revenue.	....	....	....	....	....	6,561	8,731	11,444
Net Revenue from Operation	442,304	636,861	1,043,937	918,457	964,621	1,066,605	1,239,090	1,492,295
Taxes Assignable to Ry. Operation	66,038	95,680	185,822	163,101	151,746	225,844	248,937	279,448
Operating Income	376,266	541,181	858,115	755,356	812,875	840,761	990,153	1,212,847
Non-Operating Income	6,208	4,858	9,470	17,879	10,332	11,972	14,560	26,626
Gross Income	382,474	546,039	867,585	773,235	823,207	852,733	1,004,713	1,239,473
Fixed Charges	237,996	266,580	332,506	341,396	390,196	463,013	486,784	552,608
Net Income	144,478	279,459	535,079	431,839	433,011	389,720	517,929	686,865

Popularity Built on Superior Quality of Service Supplied

The good will which the North Shore Line enjoys has been built upon the superior quality of its service. Peculiar advantages in the character of the territory served have contributed toward its financial success. Running from the heart of Chicago to the heart of Milwaukee, a distance of 86 miles, it has huge reservoirs at both ends from which to draw business, so that its trains are filled in both directions. The busy industrial cities of North Chicago, Waukegan, Zion, Kenosha and Racine are situated on the line, as are many residential suburbs along the north shore of Lake Michigan. The company supplies all the city transportation in Waukegan and a part of the service in Milwaukee.

Modern Rolling Stock and Stone-Ballasted Roadbed

Operating forty-two steel passenger trains daily between Chicago and Milwaukee, the North Shore Line gives an hourly service in both directions. Trains leave both terminals every hour, on the hour. Dining cars and parlor cars form part of the equipment. The company has been a pioneer in developing and adopting the most approved and attractive types of rolling stock. Its dining cars and parlor-observation cars are equal to the best found on any railroad. A half-hourly express service is maintained between Chicago and Waukegan and an adequate local service over the entire line. Its roadbed is stone-ballasted for the greater part of its length and work on the balance is being pushed as rapidly as possible. Its double tracks are laid with heavy 100-lb. rails.

Operates on Privately Owned Right of Way

The company owns its right-of-way from Wilmette to Milwaukee, a distance of seventy miles, except for short distances in a few suburbs—the total aggregating about three miles—where it operates on public highways. Its entrance to Chicago is over the lines of the Chicago Rapid Transit Company under a long-term lease.

Motor Coaches Operated as Railroad Feeders

The North Shore Line was among the first of the electric railways of the country to recognize the value of the motorbus as an auxiliary. It now owns and operates a fleet of forty-three motor coaches of the most approved type as feeders to the railroad and to give service in localities not otherwise adequately served.

Merchandise Despatch Service

A profitable and steadily growing Merchandise Despatch business has been developed by the North Shore Line by means of which shippers are given an overnight service to and from all points on the line.

Efficiency of Power Distribution

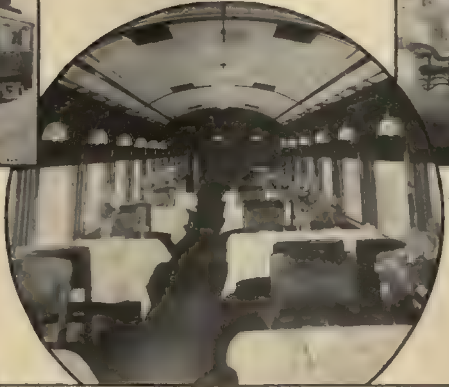
Through the extensive use of automatic sub-stations, in the development of which the North Shore Line is a pioneer, the efficiency of the power distribution system is exceptionally high with marked economy in consumption.

Strong Financial Condition

The financial structure of the North Shore Line is in an exceptionally strong position. Its funded debt is relatively low and its capitalization conservative. A large part of surplus earnings in recent years has been put back into the property, enhancing the value of its securities.

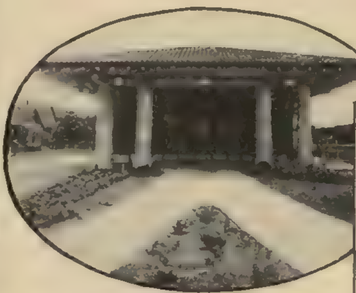
WAUKEE RAILROAD COMPANY

OBSERVATION CAR



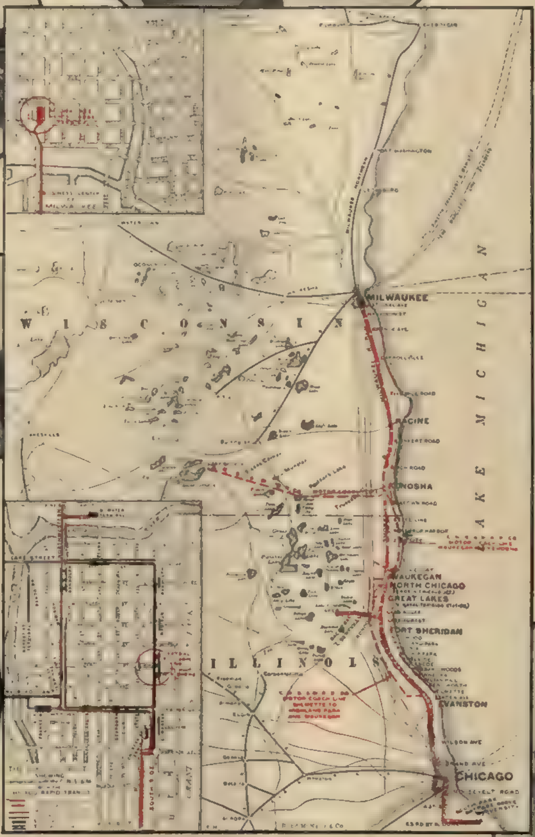
DINING CAR

MILWAUKEE TERMINAL STATION



KENOSHA STATION

CHICAGO LOOP STATION



UPTOWN CHICAGO STATION

CLUB CAR

TYPICAL RIGHT-OF-WAY VIEW

AUTOMATIC SUBSTATION

BUSES EXTEND THE RAIL SERVICE

MERCHANDISE DISPATCH TRAIN

Rails
Quality Guaranteed
1 Ton or 1000.
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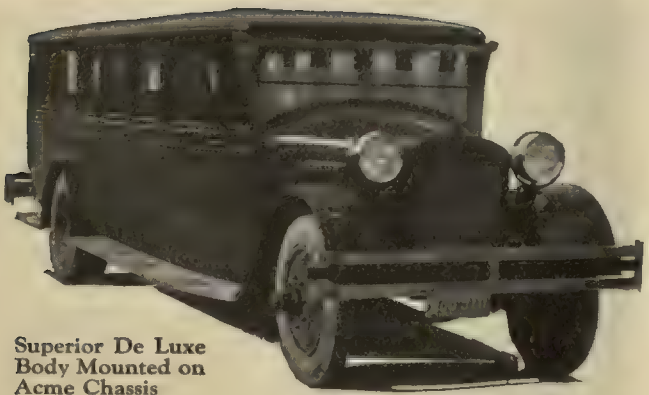
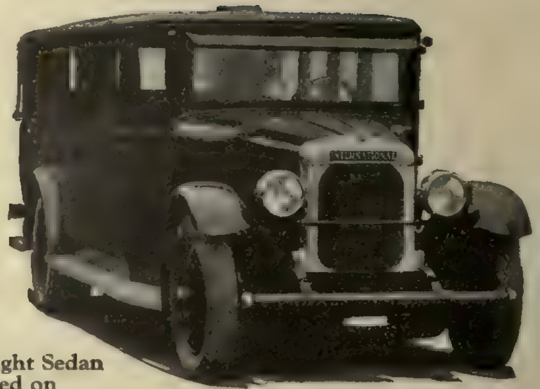


Superior De Luxe
Body Mounted on
Acme Chassis



Superior Light Sedan
Mounted on
International Chassis

Superior Is Making Better Bodies for Better Coaches

Just as chassis builders for this rapidly expanding trade are changing and improving their product, so are Superior Bodies constantly improving.

Greater beauty is being built into Superior bodies to attract patronage. Greater quality is being built into Superior bodies, to carry that patronage in comfort, with perfect safety and for years at a profit.

There is a Superior body suited to every type and make of chassis.

Write us for specifications and prices on the bodies illustrated or on any type of body that you may be interested in.

THE SUPERIOR MOTOR COACH BODY CO.
LIMA, OHIO

Superior De Luxe Body Mounted on Pierce Arrow Chassis

SUPERIOR
BODIES

GREATER COMFORT—GREATER SPEED—GREATER SAFETY—GREATER PROFITS

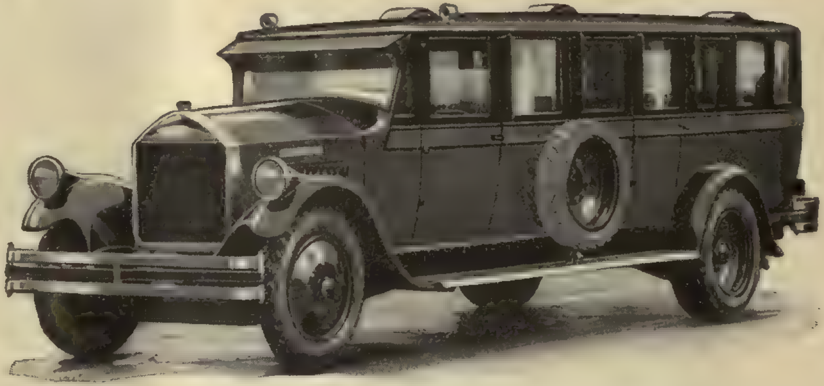
Why Electric Railways Are Buying Pierce-Arrow Motor Busses

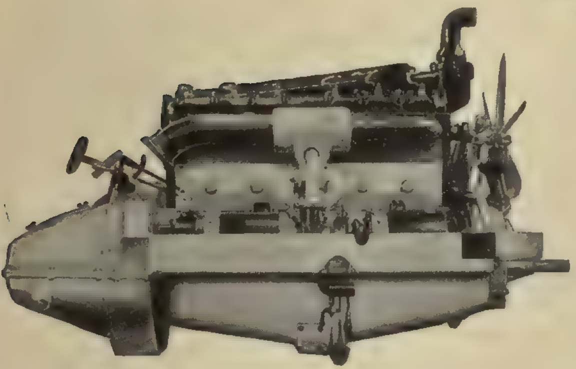
Standard Chassis

$4600

for 196-inch wheelbase, $4750 for 220-inch wheelbase, at Buffalo; including battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost.

Terms if desired





The Pierce-Arrow 6-Cylinder Bus Engine

The silent, vibrationless Dual-Valve, Dual-Ignition Pierce-Arrow Bus Engine develops over 100 horsepower at 2500 revolutions per minute. Road speeds of from 45 to 50 miles an hour can be maintained readily, if desired. Six-cylinder flexibility reduces gear-shifting.

* * *

It is a demonstrable fact that the Pierce-Arrow Motor Bus is more comfortable and more stable than a Limousine. Sidesway is absent. Passengers can ride for hours at high road speeds without fatigue.

* * *

We will gladly arrange for a complete demonstration at the factory or at principal distributing points.

The modern Pierce-Arrow six-cylinder Motor Bus is designed solely and specifically for *profitable passenger carrying.*

It makes more trips per day; carries more passengers per day, with an economy of operation that increases net profits.

It is a distinct advertising and good-will asset. It *invites* riders; it causes talk—favorable talk. Its unusual luxury and comfort win praise.

For feeder or extension service, the Pierce-Arrow Bus is an ideal unit.

Our engineers will be glad to discuss detailed facts and figures with railway representatives. And the coupon will bring interesting information about the bus itself.

* * *

The Pierce-Arrow Motor Bus Chassis, produced in two lengths of wheelbase, will accommodate the de luxe, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

Pierce-Arrow

SEND THIS COUPON FOR FULL INFORMATION

THE PIERCE-ARROW MOTOR CAR CO., Buffalo, N. Y.

Gentlemen: Please send us literature and complete information about the Pierce-Arrow Six-Cylinder Motor Bus and various types of bodies.

Name..

Address...

All Bad

Lead

There isn't a car in sight!
Why?
They are in the car barns, for repairs.
What sent them there?
Bad track conditions.

DAYTON

Tracks

to the Car Barn

THEY have to — because the cars using such tracks are constantly in need of repair. The only way to overcome this costly condition is to build efficient track — that is to say—RESILIENT track.

Resilient track, built with Dayton Resilient Ties imbedded in concrete, absorbs the shock on rolling stock and reduces upkeep to a minimum. The resilient feature of the Dayton Tie also prevents the shock of traffic from reaching the concrete foundation. In other words, the Dayton Resilient Tie saves both the rolling stock and the track.

Get all the facts about Dayton Resilient Ties.

The Dayton
Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Cushions the Shock
On Rolling Stock

Resilient
TIE

"NATIONAL" TUBULAR STEEL POLES

Uniform and neat in appearance, safe and efficient in service.

Obtainable in a wide range of dimensions.

Adaptable to various types of service, including electric railway; electric transmission; signal; telephone, telegraph and street lighting.

Our engineers will be glad to assist in selecting the right pole for any particular installation.

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Ask for a Copy of Bulletin No. 14 — "NATIONAL" TUBULAR STEEL POLES

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UPKEEP GOES DOWN

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The same factors that have made Texaco Automotive Products respected by millions of motor owners, including truck operators, are factors which enable you, a bus line operator, to secure better operation and economy through their use.

We hardly have to tell you about the increased mileage obtained from Texaco, the *volatile* gas. Or the freedom from hard carbon and minor repairs that follow the use of Texaco Motor Oil and Texaco Thuban Compound for gears.

But we do think that it is worth while to point out the advisability of purchasing Texaco Products for buses.

A. It is a good practice to buy your gasoline from a company which can serve you with high grade lubricants.

B. It is good to purchase products which can be readily and uniformly procured, insuring constant delivery and uniform quality.

C. The bus drivers who know TEXACO will appreciate your selection.

[What TEXACO has done in the way of cutting cost of operation on thousands of street cars is being duplicated on the buses of this country.]

THERE IS A TEXACO LUBRICANT FOR EVERY PURPOSE

Also Texaco Kerosene and Burning Oil

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THE TEXAS COMPANY
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TEXACO

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PROGRESSIVE publications belonging to the Audit Bureau of Circulations have adopted an open and "Above-Board" circulation policy. They lay before advertisers circulation facts that have been verified by experienced auditors.

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Is Saving Electric Railways Millions of Dollars Annually

Don't spend a dollar on your track
(New or old)
Until you get "INDIANAPOLIS"
Prices for Comparison

"INDIANAPOLIS"
Economy Products

"They cost less"

Solid Manganese Crossings
also Frogs, Mates, and Tongue-Switches
(15 years of specializing has produced a product UNEXCELLED, and LOWEST in COST, quality considered)

Electric Welders
Thoroly Efficient
(Economical and never out of COMMISSION)

Welded Rail Joints
(A COMBINATION OF EVERY ESSENTIAL FACTOR in Rail Joining and Bonding)

Welding Steel Electrodes
Absolutely Dependable

Electric Welding Supplies
Hoods, Lenses, Carbons, Etc.

Better design
Higher quality
Longer service
Lower prices

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The solid, substantial character of

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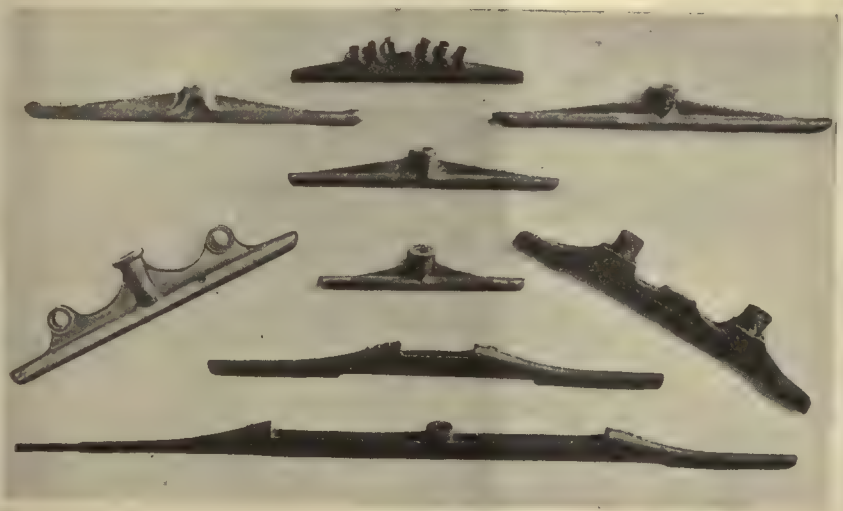
has placed it high among those permanent organizations recognized as National Institutions

Barron G. Collier



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LINE
EARS

—are made of a specially developed composition metal which enables them to withstand the repeated shocks of the wheel and pole.

Columbia line ears are built to withstand the decomposition caused by the electric arc and the clinching of the lineman's tools as he forces the wire into the groove of the ear. Weather conditions do not have any appreciable effect upon them.

All Columbia line ears are made correct to wire gauges and finished accurately to make the lineman's job an easy one. Great care is taken in machining to assure a perfect fit both in the wire groove and in tapping the threads connecting with the hangers.

COLUMBIA 1892 MACHINE WORKS

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The Chicago North Shore & Milwaukee R. R.

was awarded the

COFFIN PRIZE

that much coveted gold medal offered by the Charles A. Coffin Foundation for the electric railway company making the greatest contribution toward better transportation methods and practices.

—and the Chicago North Shore & Milwaukee R. R.

is one of the pioneer and largest users of

MILLER TROLLEY SHOES

Seven years' experience with Miller Shoes has demonstrated to this prize-winning Company their higher contact efficiency and lower maintenance cost. The "wire-wear" question has been settled — *conclusively.*

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***Western Representative:* Economy Electric Devices Co.,**
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CHILLED IRON WHEELS

from 50 *foundries*

for railway and street car service

Capacity 20,000 a day

25,000,000 in service

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
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Rochester, N. Y.
Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
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Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs
Winnipeg, Man.

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650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy-Three Years

Lifting 420 ft. of continuous rail over to track.

420 ft. lengths
Rails joined at side of road
by
THERMIT WELDING

Traffic need not be interrupted by rail welding operations. One road has successfully solved the problem by welding seven lengths of rails in advance, and dropping them into place. Only a few welds are then needed to make the job complete as —*"one continuous unbroken rail."*

The first cost is the last cost, and it compares favorably with that of any other method of joining rails.

SERVICE STRENGTH ECONOMY THERMIT WELDING

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TIOGA STEEL & IRON CO. | W^M WHARTON Jr. & CO. INC. | PHILADELPHIA ROLL & MACH CO.

Layout furnished Trenton & Mercer County Traction Corp.

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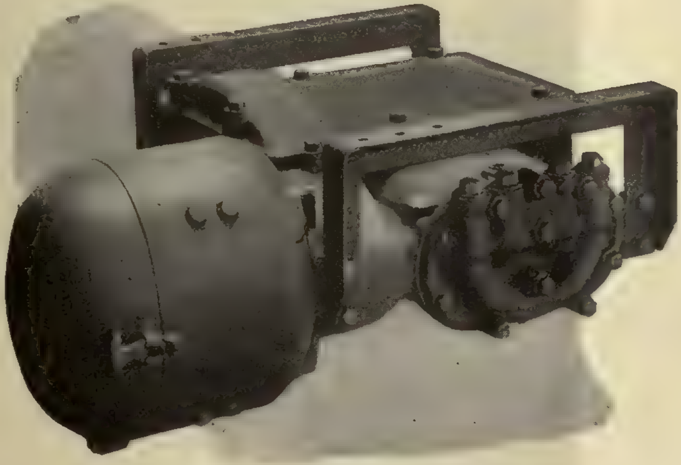
Covering a long period or years we have designed and fabricated some of the most successful trackwork in use. The adoption of Manganese Steel for trackwork was originated by this company. We are prepared to furnish special trackwork to fit any condition—switches, frogs, crossings, etc. Our engineering department is available for consultation on any difficult or unusual problem.

Wm. Wharton Jr. & Company, Easton, Pa.

Taylor-Wharton Iron & Steel Co.	Wm. Wharton Jr. & Co.	Tioga Steel & Iron Co.	Phila. Roll & Machine Co.
Plant at High Bridge, N. J.	Plant at Easton, Pa.	Plant at Philadelphia, Pa.	Plant at Philadelphia, Pa.
Manganese Steel Wearing Parts	Special Trackwork Cylinders for Gases	Forgings Hammered and Pressed	Rolls and Rolling Mill Machinery

ALLIS-CHALMERS

AA-7B
Air Compressor



Compressor for Street Car Mounting

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crankshaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.

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You can depend upon the
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ERICO TYPE SR
Portable Arc Welding and Bonding
OUTFIT

Triple utility—

Brazed Bonding

For Brazed Bonding the Series Type Rheostat mounted on a wheeled Larry, governs the current drawn from the trolley wire thru the Sectional Pole, Fuse and Breaker. The Portable Welding Furnace converts this current to heat, uniting the Brazed Bonds with the rail. With a crew of three men, 10 Brazed Bonds per hour can be easily applied. On new track 15 to 20 bonds per hour may be expected.

Arc Weld Bonding

For Arc Weld Bonding five current taps on the Rheostat permit flexible current control. Maximum capacity from full to about half line voltage, 200 amperes. An Arc Weld Pencil Holder with Lead, and a Shield or Hood are the only additional equipment necessary for arc welding.

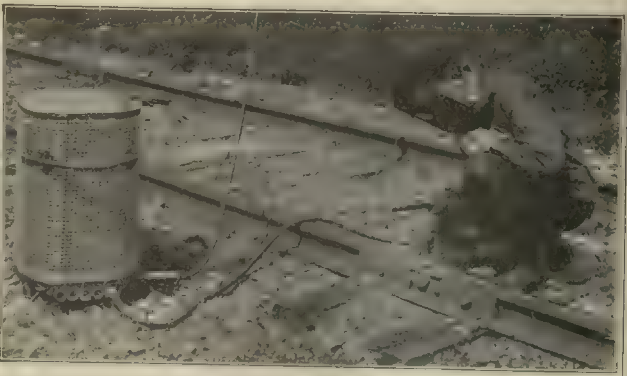
General Arc Welding

Shop, repair, and track welding of all kinds can be profitably done with the Series Type Outfit. The Rheostat is made removable from the Larry for greater convenience in handling. Two men can carry it with little effort anywhere in the shop, or it can be transported in passenger car vestibules to points where welding is required.

Portable, simple, durable—no moving parts —no maintenance

for further details, write

The Electric Railway Improvement Co.
Cleveland, Ohio



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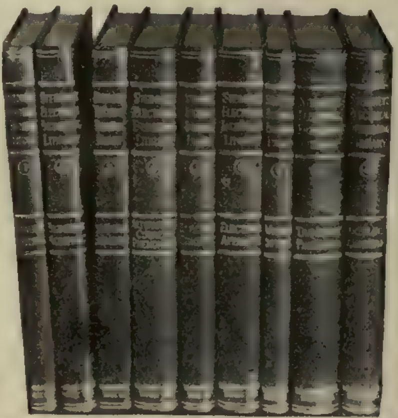

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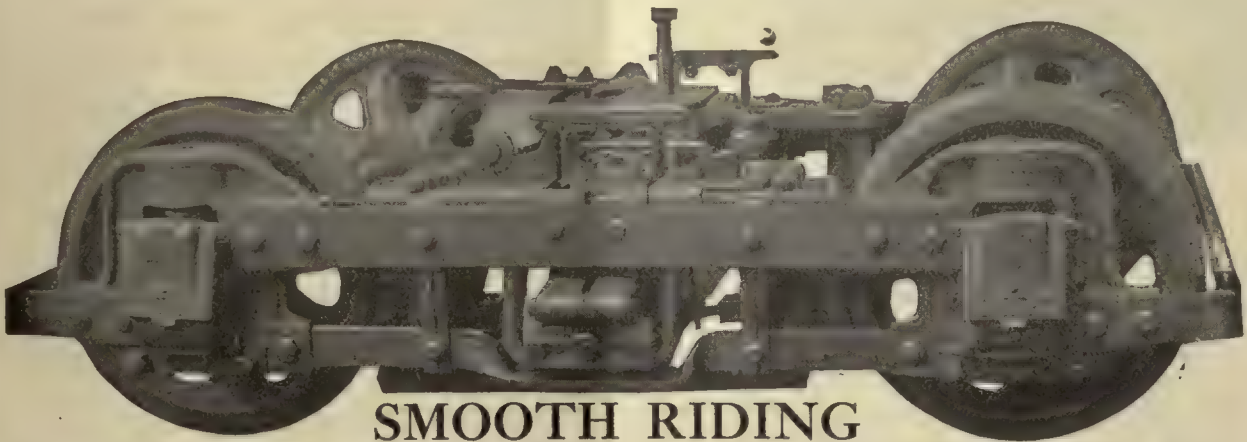
S. WITH A.
TAYLOR STRAIGHT ACTION BRAKE



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LOW MAINTENANCE COST—Absolute Safety
Center Plate Height 22¾ in. with 26 in. Diam. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

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SPECIFICATIONS ON REQUEST Established 1892 SEND FOR PORTFOLIO

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"Thomas-built"
safeties

For the Augusta-Aiken Railway & Electric Corporation
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Cars of every type, both city and interurban. Equipment specialties, seats, sash, doors, ventilators, trim, etc.

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PERLEY A. THOMAS CAR WORKS, HIGHPOINT, N. C.

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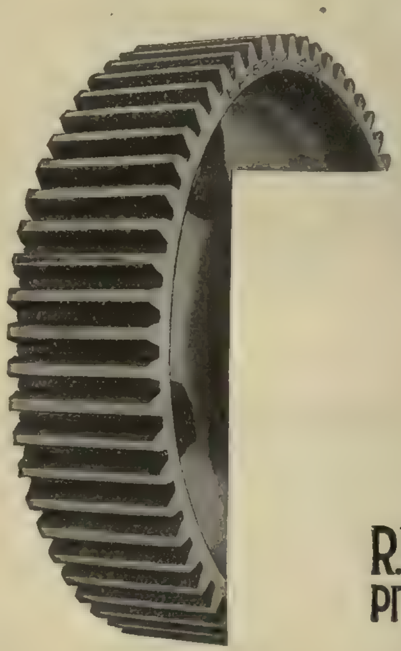
but also better cars. That's what the discriminating American public now demands of their electric railway transportation systems. More frequent service — yes! But they also look for new, modern cars. It doesn't do to temporize with makeshift rebuilt cars of obsolete type.

St. Louis Quality Cars

Embody all the most modern features intended to enhance the safety, comfort and convenience of passengers. Let us figure on your specifications.

St. Louis Car Company, St. Louis, Mo.

"The Birthplace of the Safety Car"



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Can You Get This Guarantee With Any Other Gears, At Any Price?

We guarantee Nuttall BP Gears to last four times as long as untreated gears in the same service, and that means a cost saving of about 70%. If they are Helical Gears, they will last still longer and greatly reduce motor maintenance

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Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

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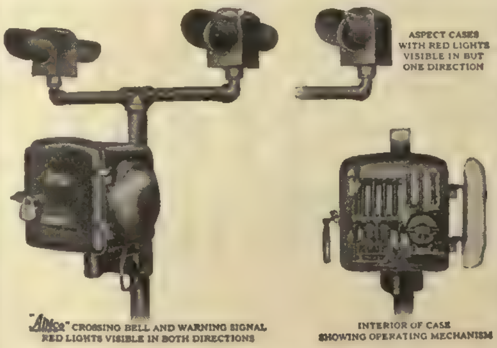
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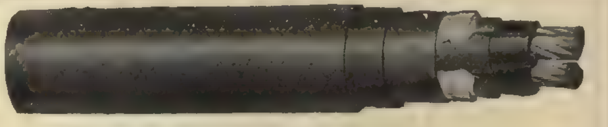

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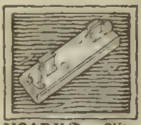
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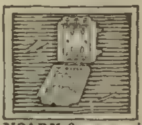
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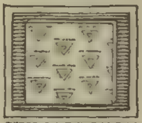
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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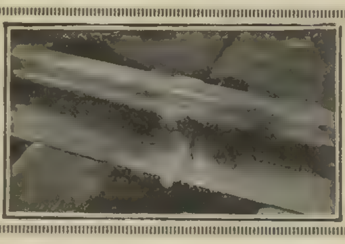

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ALUMINO-THERMIC JOINTS

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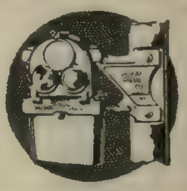

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Special Work for Street Railways

Frogs, Crossings, Switches and Mates
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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

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These men are thoroughly familiar with shop practice and manufacturing methods, and their work is absolutely dependable.

Our bulletin 28 gives all the facts—write for your copy now.

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Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.
Sales Representatives in the Principal Cities

Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

TULC
A
LUBRICANT

We make a specialty of
ELECTRIC RAILWAY
LUBRICATION
We solicit a test of TULC
on your equipment

The Universal Lubricating Co.
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

Standard of Quality

REG. U.S. PAT. OFF.
TRADE
HOPE
MARK
MADE IN U.S.A.

Quality is the total of good materials and careful manufacture.

That is why, for 40 years, manufacturers of electrical apparatus have found HOPE tapes to be the Standard of Quality.

Let us send you the HOPE Sample Booklet

Electric Tape

HOPE WEBBING COMPANY, INC.
PROVIDENCE, RHODE ISLAND
New York Troy Chicago

Don't Overlook Opportunities

Men who regularly keep in touch with the market through other channels often overlook the many opportunities that are to be found in the

SEARCHLIGHT SECTION
For Every Business Want
"Think SEARCHLIGHT *First"*
0156

Memorize the label

Memorize the Label

The Beckwith-Chandler label brands the contents of each can as the highest possible achievement in durable, economical, super-quality paints and varnishes, especially compounded to meet transportation needs.

Full details on request

The Beckwith-Chandler Company
193-211 Emmett St., Newark, N. J.
320 Fifth Avenue, New York
Highest Grade Paints and Varnishes.

RICO

Sanitary Straps

Hand straps which are clean and attractive to look at, comfortable and sanitary to hold.

Rico Sanitary Straps, white and shining, are so far superior in every way, to the ordinary leather or other straps, that the cost is trivial compared to the advantages.

SEND FOR BULLETIN 301

RICO SPECIALTIES
Coasting Recorders
Anti-Climbers
Sanitary Straps
Motor Covers
Vacuum Oilers

RAILWAY IMPROVEMENT CO.
1 PERSHING SQUARE NEW YORK, N.Y.

PS HEATERS

Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

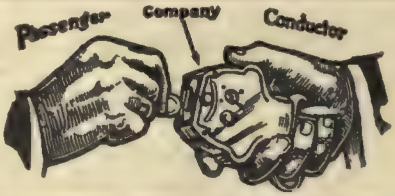
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

THE
"CLEVELAND"
is the practical fare box for the
ONE MAN CAR
Let us tell you why.
THE CLEVELAND FARE BOX CO.
Cleveland Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ont.
Coin Counting and Sorting Machines, Change Carriers

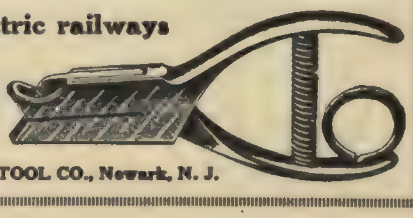
HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco



Direct Automatic Registration
By the
Passengers
Rooke Automatic Register Co.
Providence, R. I.

N-L STOP SIGNAL
Simple in Operation, Installation and Maintenance
Canadian Representative:
Railway & Power Eng. Corp.,
Toronto, Ontario
The Nichols-Lintern Co.
7960 Lorain Ave., Cleveland, Ohio

75% of the electric railways
use
B-V Punches



Send for Catalog
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

OHMER
FARE REGISTERS

They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

OHMER FARE REGISTER CO.
Dayton, Ohio

Double Register

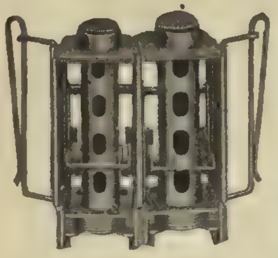
Both our latest single and double registers are now equipped for electric as well as mechanical hand or foot operation.

Full Electric
Operation of
Fare Registers

A completely satisfactory fare registration system is one that has the confidence of the public, the conductor and the accounting department. The simplicity and accuracy of International Registers maintained for more than thirty years, is combined in the later types with the extra speed and convenience of electric operation.

The International Register Co.
15 South Throop St., Chicago
Exclusive Selling Agents for HEEREN Enamel Badges

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

HIGH SPEED MONEY CHANGERS

1924 model —without rivets— ready for delivery

Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent

"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request.

The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.
HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

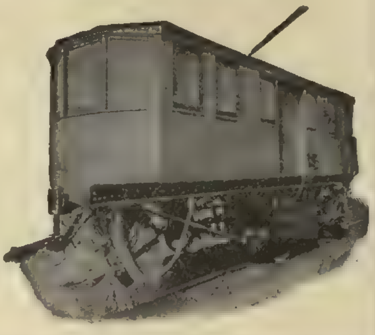
RAILWAY UTILITY COMPANY

CAR COMFORT WITH UTILITY HEATERS REGULATORS VENTILATORS

141-151 West 22d St.
Chicago, Ill.

Write for Catalogue

1328 Broadway
New York, N. Y.



McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.

Street Cars
Trucks
Snow Sweepers

Defective Wheels Corrected While They Run

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

ROLLING STOCK

"that rolls"

USUALLY HAS AXLE BEARINGS

lined with

AJAX BULL BEARING ALLOY

BETTER THAN BABBITT

Wears Longer—Runs Cooler—Costs Less

THE AJAX METAL COMPANY
Established 1880
Main Office and Works: Philadelphia, Pa.
New York Chicago Boston Cleveland

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Traction Experts Sing the Praise of **THORNTON** Trolley Wheels

"Best I have ever seen for high speed cars," says the master-mechanic of the Cincinnati Traction Co. "Almost impossible to wear out," says an official of the Ohio Valley Electric Railway Co. and so it goes. They are built to outlast, outclass and outrun all other trolleys—and they are doing it.. An investigation will prove it.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

HASKELITE ROOFS AND HEADLININGS

Ad racks, side linings, truss planks and flooring are being used in 17 new Interurban cars for Illinios Traction Company.

HASKELITE MANUFACTURING CORPORATION
133 W. Washington St., Chicago

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

0096

For better Axles Specify
"VALSCO"
HEAT TREATED CAR AXLES
LACLEDE STEEL CO.
Arcade Bldg. St. Louis, Mo.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

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345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

BRAKE SHOES
AERA Standards
Brake Heads

Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

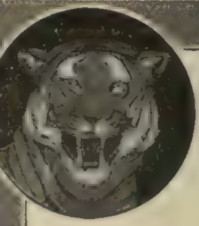
The Differential Steel Car Co.
Findlay, Ohio

B. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.
Grand Central Terminal, 452 Lexington Ave. Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago

RAILWAY SUPPLIES

Garland Ventilators
Feasible Drop Brake Staffs
Flaxlinum Insulation
Ft. Pitt Spring & Mfg. Co., Springs
Economy Electric Devices Co.'s Power Saving and Inspection Meters.
Drew Line Material and Railway Specialties
C-H Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Turnstile Car Corporation's Turnstiles
Dunham Hopper Door Device
Genesco Paint Oils
Tool Steel Gears and Pinions
Anglo-American Varnish Co., Varnishes, Enamels, etc.
The Aluminum Field Coils
Truck and Car Repair Parts
National Hand Holds
E. Z. Car Control Corporation's Safety Devices
Anderson Slack Adjusters
Yellow Coach Mfg. Co.'s Busses
Bell Locked Fare Box and Change Maker



MORE-JONES
"TIGER" BRONZE
AXLE & ARMATURE BEARINGS

Strong - tough - durable
anti - frictional
economical

MORE-JONES BRASS & METAL CO
ST. LOUIS MISSOURI

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches..............$4.50 an inch
4 to 7 inches.............. 4.30 an inch
8 to 14 inches.............. 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.F J.

POSITIONS VACANT

ASSISTANT supervisor of track wanted. Must be practical man; experienced on high speed electric lines. Permanent position. State salary expected. P-708, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

EXPERIENCED track foreman wanted for subway work; permanent position. State salary. P-707, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SCHEDULE,-Maker wanted by large street railway; must be competent to analyze traffic data and make schedules for difficult and large routes; give experience. age and salary expected. P-713, Electric Railway Journal, 10th Ave. at 36th St., New York.

TIME Table Makers. One senior and one junior wanted for growing city property in Middle West; give age, experience and salary expected. P-714, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

CAR painter, who is an all around man and has had many years of fine experience would like a position with some Street Railway Company whose shops are located in or near a country place, could take charge if desired. PW-716, Elec. Railway Journal, 10th Ave. at 36th St., New York.

COMPETENT operating manager—Desires change. Interurban, Street Railway or combination railway and light company. Experience in public relations. Will consider sub-executive position. PW-715, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic now employed desires to make change; experienced heavy and light interurban, city car and bus maintenance and overhauling. PW-711, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITION wanted as superintendent of small property; twenty-eight; experience in electric street railway work as car repair-man, motor inspector, supervisor, claim adjuster, superintendent employment and superintendent transportation, would consider superintendent of shop, car barn, foreman, inspector transportation department or investigator of claims; best of reference as to character and ability. PW-712, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

Rails
New-Relaying

See our full page announcement on Page 27.

L.B.FOSTER CO.
PITTSBURGH - NEW YORK CITY

Air Compressors For Sale

1—Laidlow Dunn Gordon Air Compressor; steam size 5 in. (Corliss Type Poppet Valve) 15½ in. diameter high pressure cylinder, 25 in. diameter low pressure cylinder, 36-in. stroke. Air cylinder 16 in. high pressure, 26 in. low pressure, 6-in. air line; capacity 2200 cu. ft. at 110 lbs.

1—Chicago Pneumatic Tool Company Air Compressor (Slide Valve) Steam Pipe 5 in.; 20 in. high pressure, 31 in. low pressure, 24-in. stroke. Air 16½ in. high pressure, 27 in. low pressure; 6-in. air line; 1580 cu. ft. of air per minute of 100 lbs.

Call or Write.

J. F. TORRENCE
3722 Fifth Avenue, Pittsburgh, Pa.

FOR SALE

Boiler Feed Pumps

2—Worthington pot valve duplex, 14x8½ x15, fitted with brass rods, in good working condition, ready to operate 250 lb. pressure, can ship immediately.

LEXINGTON UTILITIES COMPANY
Lexington, Kentucky.

FOR SALE

20 ALL STEEL CARS

Practically New

Length over bumpers...........50 ft. 10 in.
Length over corner posts........36 ft. 6 in.
Width over all................ 8 ft. 7 in.
Height over all.................11 ft. 7½ in.

Cars are complete and ready for operation including WH air brakes. Seat 52 people.

TRUCKS

Standard 050 4 ft., 10-in. wheel base.

ELECTRICAL EQUIPMENT

Consists of a 4 WH-514 motors and K35 controllers for double end operation.

Code "Cun"

Transit Equipment Company
Cars—Motors
501 Fifth Avenue, New York

FOR SALE

INTERURBAN CARS

Ten high-speed standard interurban cars, 55-ft. long, Baldwin trucks, Westinghouse 100 hp. motors. Cars are available on account of adopting cars of lighter weight. Address

FS-706, ELECTRIC RAILWAY JOURNAL,
1570 Old Colony Bldg., Chicago, Ill.

FOR SALE

NOW IN SERVICE

20 CARS COMPLETE

30-ft. bodies; seat 44, Brill 27-F trucks; West. 101-B or 307 motors. Low Price.

ELECTRIC EQUIPMENT CO.
601 Commonwealth Bldg., Philadelphia, Pa.

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

0100

Competent Men Are Watching—

for the opportunity you have to offer, Mr. Employer. You can secure the best available man for the work through an ad in the

SEARCHLIGHT SECTION

That's where they are looking for your announcement
The cost is small.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers
Railway Improvement Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stand
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.

Axles, Bus
Standard Steel Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
More-Jones Brass & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

Benders, Rail
Railway Track-work Co.

Boiler Tubes
Nat'l Tube Co.

Boilers
Babcock & Wilcox Co., The

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

Boxes, Switch
Johns-Pratt Co.

Brackets and Cross Arms (See also Poles, Ties, Posts etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Bulkheads
Haskelite Mfg. Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
Brockway Corp.
N. Y. Transportation Co.
Pierce-Arrow Motor Car Co.
St. Louis Car Co.
Superior Motor Coach Body Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables (See Wires and Cables)

Calculating Machines
W. A. Morschhauser

Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.

Cambric Yellow & Black Varnish
Mica Insulataor Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Apparatus
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
More-Jones Brass & Metal Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Change Carriers
Cleveland Fare Box Co.
Galef, J. L.

Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coasting Recorders
Railway Improvement Co.

Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.

Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Reinforcing Bars
Laclede Steel Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Conduits, Underground
Std. Underground Cable Co.

Connectors, Solderless
Westinghouse Elec. & M. Co.

Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.
Rome Wire Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Work
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Couplers, Car
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Ramapo Ajax Corp.

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Crossings, Track, (See Track, Special Work)

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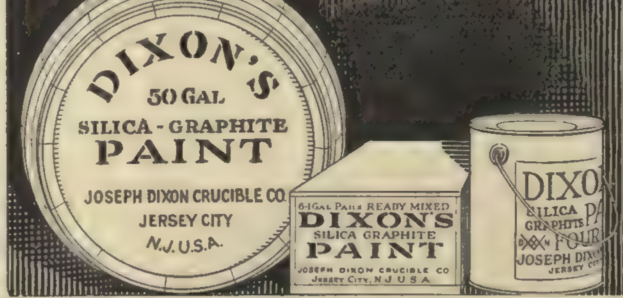

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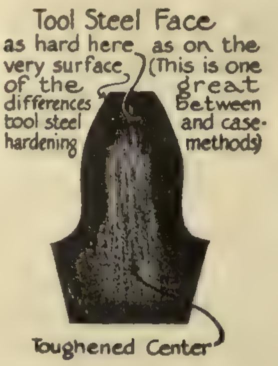
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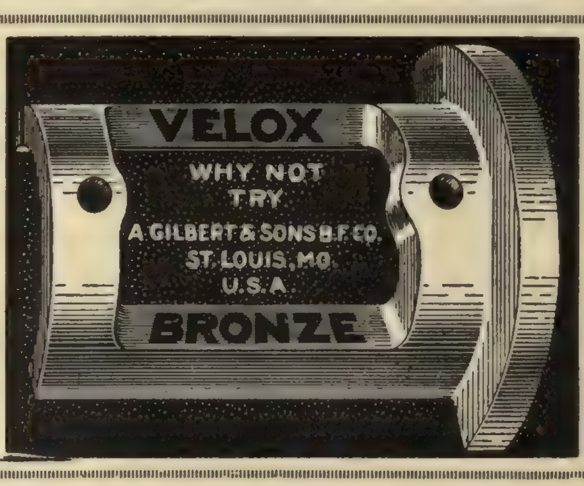
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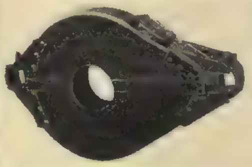

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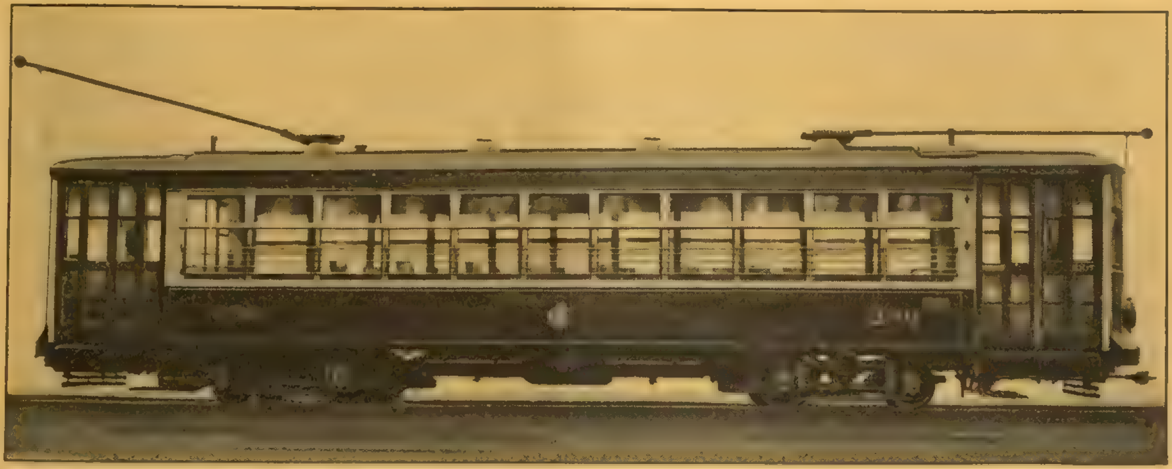

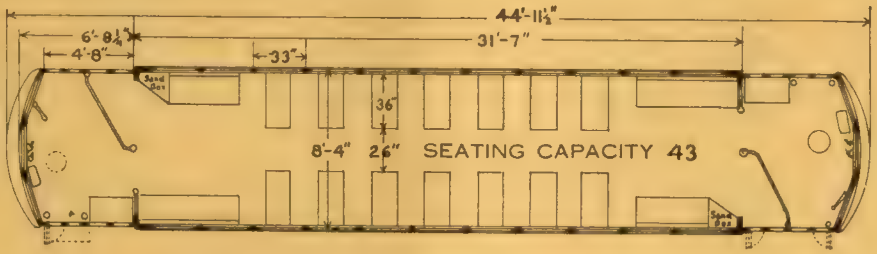

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McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York

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Journal of Electricity
(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
Electrical Retailing
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

They Are Constantly Needing It

"ONE more thing. We are constantly needing the ELECTRIC RAILWAY JOURNAL here for reference. Please make a subscription for this office, and be sure to include this week's issue."

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Advertising Index—Alphabetical, 56; Classified, 52, 54; Searchlight Section, 51

Mr. Spencer voices a fundamental:

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> **"It is too often assumed, when a series of joints is completed, that all can be forgotten for some time, and the writer knows of no better example of when 'a stitch in time can save nine' than in the careful watching and, when necessary, the giving of slight grinding attention to a polished receiving rail at the joint."**

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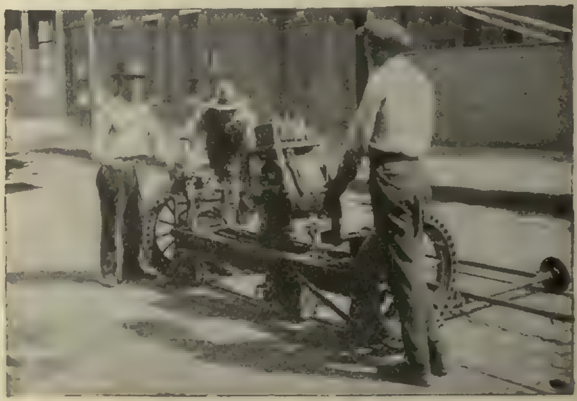
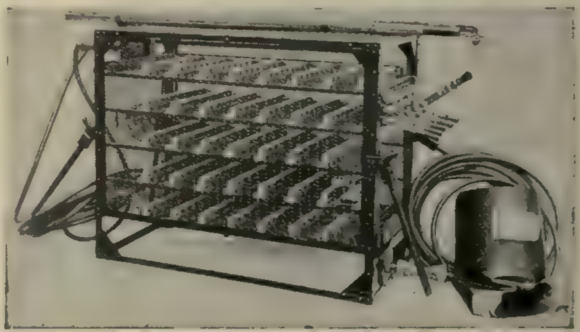


"Universal" Rotary Track Grinder

"Atlas" Rail Grinder

"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder

A MANUFACTURING SERVICE FOR THE INDUSTRY

CORE DEPARTMENT

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A.E.R.A. Committee on Safety Car Operation, 1921

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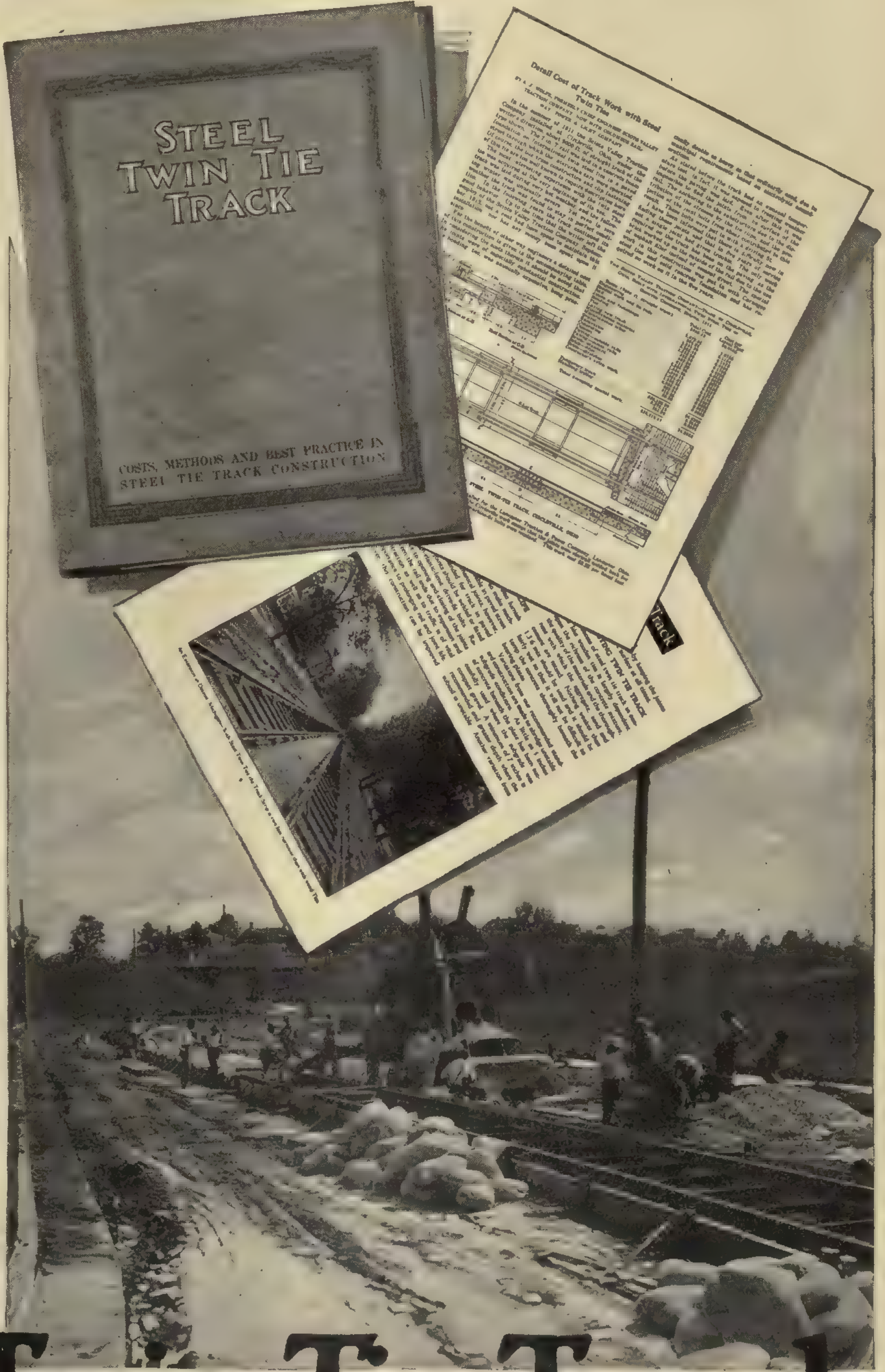
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Track

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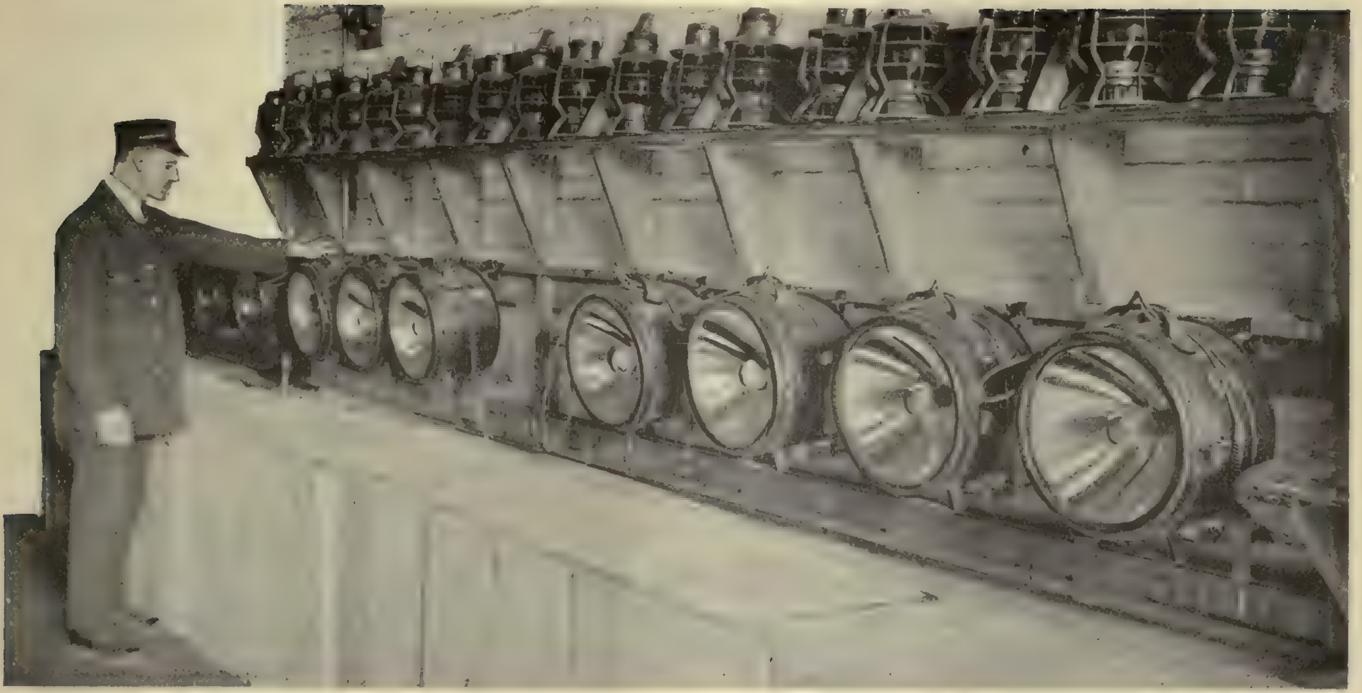

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—from the viewpoint of the man behind!

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Golden Glow Headlights are made in various styles and sizes to suit any requirements. Portable or built-in,— dash installations and roof mountings.

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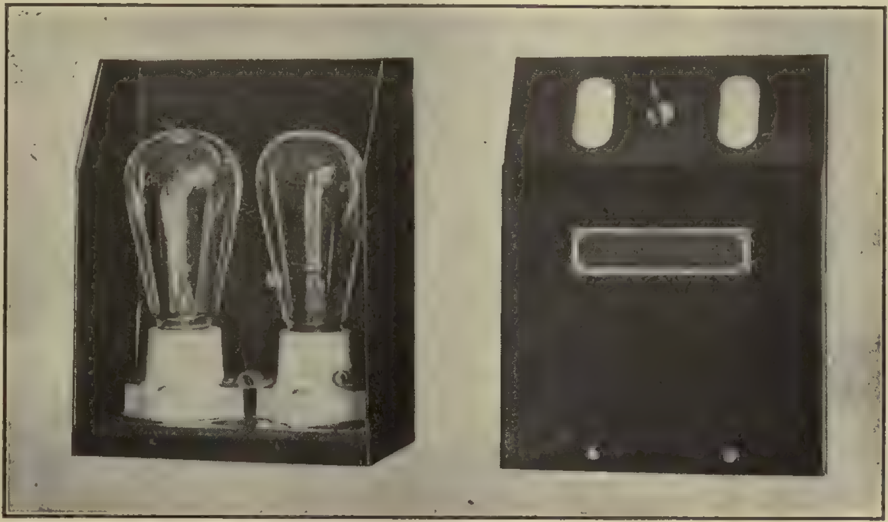
When the car is ready to start

This notifies the motorman
and tells the crossing cop

National Pneumatic



National Pneumatic

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Motorman's Signal Light

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Here is a cab signal light which informs the traffic cop on the crossing as well as the motorman, when the doors are closed and car is ready to start. Secures traffic co-operation to prevent unnecessary delays. The box is installed so that holes in back of box come just above the window ledge, and the light shines out in front.

A real time saver for your city cars.

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Originators and Manufacturers
PRINCIPAL OFFICE: 50 Church St., NEW YORK
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Works—Rahway, New Jersey
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The new, four-track Central Railroad of New Jersey Bridge over Newark Bay will be located 100 feet north of the present structure. The new track level will be 30 feet higher than the old.

New structure is to be 7500 feet long with Concrete Piers weighing 1500 tons each.

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In the Concrete construction, shown above, they are regularly applying approved methods of field control to keep the quality of the Concrete uniform and particularly to maintain desired strength.

Strengths are verified at regular intervals by testing field cylinders.

Proportions of fine and coarse aggregates are accurately determined by fineness modulus.

Slump tests are being made daily to control consistency.

This is only one of many jobs where the most modern field methods of control are directly helping to assure better Concrete with greatest economy.

* * *

The work on the Newark Bay Bridge is being done under the direction of A. E. Owen, Chief Engineer, J. J. Yates, Bridge Engineer, and H. E. Van Ness, Construction Engineer, Central Railroad of New Jersey.

Let us tell you more about the practical advantages of field methods of quality control. Write the nearest office listed below for your free copy of "Concrete Data for Engineers and Architects."

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GENERAL ELECTRIC

New York, July 12, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 64
Number 2

Some Recent Arbitration Awards and the Labor Market

THE bull stock market now in progress in the financial district gives the impression to some of another coming era of prosperity, inflation and high wages. Undoubtedly, the United States is in good commercial condition. But it should be remembered that call money and interest rates for short periods are at a very low figure, the lowest for a long time. This always has a stimulating effect on the market for securities, particularly bonds. Low money rates are also usually an indication that there is not a great call for capital by new enterprises or extensions of old ones. On the whole, then, high prices for securities are not a sure sign of that industrial activity which is usually considered the synonym in business of good times.

Electric railways are particularly interested in the situation because of its effect on the flotation of new securities and on the labor market. So far as flotations are concerned, this is undoubtedly a good time to market sound securities, and electric railway issues are coming to be considered by the investing public as being in this category.

In regard to the labor market, cheap money should eventually stimulate business and industrial activities and thus finally put up wages if no other conditions arise to intervene. Wages in the electric railway industry, however, do not move in such close parallel to the general labor market as in many other lines of business, and to some extent less even than formerly in the electric railway industry. The reason for this is partly that there is a lower turnover on nearly every property, so that wages are in somewhat less sympathetic touch with those of the general labor market either to go up or down, and partly because of the growing tendency to settle labor disputes by arbitration rather than by strikes.

A. S. Richey's June figure for street railway wages, published in the issue of this paper for June 28, shows that electric railway wages are now 120 per cent above the 1913 figure and within 12 points of the highest figure ever reached, namely, in September, 1920, when the wages index, as compared with 1913 at 100, was 232. In fact, there has been a constant increase in electric railway wages since April, 1923, as shown by the following statement, all figures being based on 1913 at 100: April, 207; May, 208; June, 210; July 212; August, 214; September, 215; October to December, 218; January to May, 219; June, 220.

Incidentally it should also be said that all of these figures are far in excess of those reached during the war. The armistice was signed Nov. 11, 1918, and at that time the electric railway wages index was the highest then reached, namely, 154, as compared with 1913. The present figure is more than 50 per cent higher than this figure of November, 1918.

The situation is one which demands attention by all electric railway companies. Are some recent arbitration decisions increasing railway wages to a greater extent than is warranted, and will not fares have to be raised if this constant upper trend continues?

Illinois Commission Takes a Broader View

A CHANGE of attitude on the part of the Illinois Commerce Commission from its previous position of antagonism to the Chicago Surface Lines is shown in two recent orders affecting that property. Both of these are distinctly for the benefit of the car riders of Chicago, one of them calling for extensions of track and the other for a rerouting of the cars in the downtown district.

Wartime conditions and other obstacles have prevented the railway from carrying out the provision of the ordinance under which it operates that calls for a regular extension program of track extension at the rate of some 23 miles per year. Under the present city administration, which has been constructive in its policies, a compromise program has been arrived at and placed before the commission for its approval. This program required modification of a previous order which authorized the constituent companies to draw from their reserve certain amounts for the addition of new cars to the system. Now the commission has extended the permission to allow part of such reserves to be used for track extensions. Further, it has taken a strong stand that the companies should not be required to construct tracks until the city has made provision for the paving of the streets on which they are to be built.

In this connection the order says:

"It is pertinent to point out that the practice of requiring a street railway to be laid in an unimproved street which involves the subsequent removal of the tracks and destruction of the roadbed to permit sewers, water mains and service pipes to be laid is uneconomical and imposes an unreasonable burden and hardship upon the street car riders."

The commission also disapproves of the previous requirement that the companies pave their rights-of-way while the rest of the street is unpaved. "It is obvious," states the decision, "that this is calculated to interfere with safe and efficient street railway operation and detrimental to the traveling public."

This new viewpoint of the Illinois Commerce Commission represents a standard of sane regulatory methods which may well be followed in the rulings of other commissions. If it continues it means much to the investors in utilities and in the end will be helpful also to the patrons.

Should the Railways Run the Taxicabs?

A STRONG argument in favor of the supply by electric railway companies of all of the kinds of transportation needed in the city is made in this week's issue by George H. Davis of Ford, Bacon & Davis, Inc. Mr. Davis approaches the situation from somewhat a new angle in that he estimates the number of vehicles required in cities of more than 100,000 population to give the public the transportation service which it needs. In general, his estimate of the number of passenger electric railway cars does not differ greatly from those at present. His figure, exclusive of rapid transit lines, is 30,000 44-passenger double-truck motor cars with trailers, but he would increase considerably the carrying capacity of the buses used in city service, and he believes the railway company should control them and also the taxicabs in the city. The purpose of this would be to eliminate duplication—sometimes triplication—of existing service.

All may not agree with Mr. Davis's total figures or with the division which he proposes for the different means of transportation, or with the types and capacities of vehicles suggested. The suggestion that railway companies should engage in taxicab service will also provoke comment, as this individual service seems a little far afield from that supplied by the average electric railway. There is no doubt, however, that the taxicab is a favorite form of public transportation and that by the application of scientific principles of routing, in co-ordination with other means of transit, much of the present taxicab dead mileage could be eliminated. In other words, if the principles of co-ordination of all means are to be followed to their logical conclusion, there are arguments in favor of the operation of taxicabs by the organization that runs the cars and buses.

Decision to Abandon Synchronized Traffic Control Not Based on Its Shortcomings

THERE has been so much muddling in the matter of traffic control, so much talk about the complexity of the problem and so little energetic action to solve it that it was refreshing to see Gen. Smedley Butler, Director of Public Safety in Philadelphia, attack the subject forcefully and put into effect a new method of regulation. Although General Butler's plan was similar in some respects to the synchronized traffic control systems found elsewhere, several novel features contributed materially to its successful operation.

Probably the most important difference between General Butler's plan and those tried in other cities was that the signal lights were used primarily for the information of the traffic policemen and were not intended directly to control the actions of the drivers of vehicles. On that account his system had a flexibility far greater than that of electrically interlocked signals at individual street intersections. At the same time it accomplished to a considerable extent the synchronization of the signals of the various traffic officers. Even a skeptic, distrusting all schemes for regulating traffic by colored lights must have been impressed by watching how it worked on the street.

After several weeks' trial, during which it appeared to meet with the almost universal approval of the traveling public, both automobilists and street car riders, the plan has had to be abandoned because the City Council refused, apparently for political reasons, to appropriate money for the installation of necessary equipment. That such was the reason for the refusal is indicated by the fact that the Council on the same day when it declined to appropriate the funds necessary to carry out the plan of the Director of Public Safety appropriated an equal amount of money for the purchase and installation of more old-fashioned signals.

However, General Butler should feel well satisfied with the results of this experiment. Philadelphia may not desire to avail itself of an improvement in traffic control methods, but other cities that have had a chance to see the plan in operation may well give it a trial.

Trying to Raise Himself by His Bootstraps

A POINT of view at variance with that of using technically trained men for motor testing work in a railway shop, as set forth in a recent editorial in this paper, was taken in a letter to the editors published in the July 5 issue of ELECTRIC RAILWAY JOURNAL. The correspondent believes that a more satisfactory plan would be for the railway men now supervising the various departments to secure the services of boys or young men and give them several years practical training in the shops.

It may well be doubted, however, if this plan would be any better than, or indeed as good as, the plan of employing graduate electrical engineers. Not all such engineers would stick to the railway business and make a success of it; neither would all of the boys picked by the superintendent and trained in the shop exclusively. Experience shows that the knowledge that has been gained through consistent study places the college men above their competitors in those phases of the work that demand the use of engineering principles. The fact that the two classes of men are more or less in competition, however, emphasizes the failures of college men which do occur and gives the impression that they are rather numerous.

One of the largest electric railways in this country has for years made a practice of securing the services of engineers just out of college. They are put through a two-year training course to familiarize them with the various departments of the railway. At the end of that time they are given permanent positions where the course of training has fitted them to do the work. Only a small proportion of the men who begin this training course go through with it and take permanent positions with the company. Others find that their inclinations do not lie in the line of railway work or that more attractive opportunities exist elsewhere. But the company is satisfied to undertake the training of all these men for the sake of those who remain.

Aside from the question of whether more college men or non-college men are likely to stick at the railway game, there is another serious objection to the plan advocated by the correspondent. It might be possible to train the boys to do as good work as their teachers, but there would be little reason to expect them to do any better. Instead of having new men enter the organization, bringing with them new ideas, he would have the old ideas passed on from generation to generation. So far as improving the quality of the work and modernizing methods in the railway shop goes, this procedure would resemble that of a man trying to raise himself by his bootstraps.

Changing Tunnel for Rapid Transit

In 50 Hours with 1,526 Men the Boston Elevated Railway and the Boston Transit Department Converted the East Boston Tunnel from Surface Car Operation with Overhead Trolley to Third Rail Rapid Transit Train Operation—A New Station Was Built at Maverick Square

Two-Car Units of Type Used in East Boston Tunnel

ONLY a short time ago the local newspapers of Boston carried items announcing that the Boston Elevated Railway had changed its operation in the East Boston tunnel from surface trolley cars to third-rail rapid transit trains. This information was also published in the news columns of ELECTRIC RAILWAY JOURNAL, issue of April 26, page 671. Behind these bare statements of fact was hidden a story of engineering and construction achievement, a story of railroading, of interest to every railroad man.

On Friday evening, April 18, when the last scheduled trolley car entered the East Boston tunnel, it made its routine trip in the usual way. No ceremonies marked its entrance but feverish construction activity followed the completion of its trip. No formal speeches marked its exit but the curt, forceful language of engineers, superintendents and foremen followed in its trail. It was the last surface passenger car to travel through this twenty-year old hole under Boston harbor.

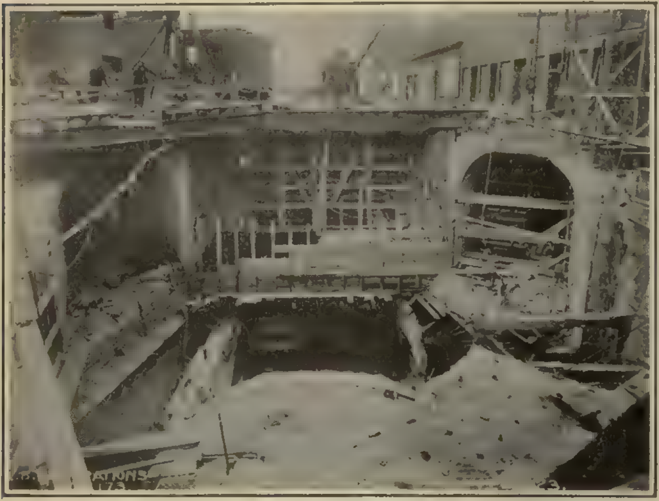
For two decades, trolley cars operated through this tunnel had met the transportation requirements. To be sure they had been crowded in up to the maximum frequency possible with a modern block signal system. And then they had been coupled together in two and three-car units, so heavy had the traffic become. But at last the fact had to be faced that this service was inadequate. Rapid-transit operation, with high-speed, multiple-unit trains of greater length had to be introduced.

To make the change involved the construction of a terminal station at the East Boston end of the tunnel. Formerly no station had been needed as the surface cars simply ran up the grade out of the tunnel onto the city streets at Maverick Square, the tunnel portal. But rapid transit trains must be kept off the streets—hence it became necessary to build a terminal under and around the existing tunnel portal, without interrupting the operation of the cars.

The East Boston tunnel, like other subway and tunnel facilities in the city of Boston, is the property of the city and is leased to and operated by the Boston Elevated Railway. All construction and reconstruction work on such tunnels is handled by a public commission, the Transit Department of the City of Boston.

Reconstruction work was commenced in the fall of 1921. An interesting feature of the undertaking was the employment of needy ex-soldiers on the work. At that time the unemployment situation throughout New England had reached alarming figures and a large proportion of the unemployed were veterans of the World War. With a view to reducing the constantly increasing payroll for soldiers' relief, Mayor Curley issued instructions to have this work done by day labor, preference to be given to former service men. Although many of these men were inexperienced in work of this character, they soon acquired the necessary knowledge under skillful supervision, and this massive structure was completed within the time limit, despite unforeseen construction difficulties and the abnormal weather conditions. Day and night for over two years, crews of men were engaged in excavating below tide water, removing and relocating water, sewer and gas pipes, telephone and telegraph conduits and electric lighting service without even momentary interruption. Night cars operated regularly regardless of the fact that more than 15,000 charges of dynamite were shot off for blasting sections of the old concrete tunnel which had to be removed.

About 125,000 cu.yd. of material had to be excavated, a great proportion being removed from under large buildings which had to be carefully underpinned; 28,000 cu.yd. of reinforced concrete was installed requiring



Cross-Section of Tunnel During Reconstruction at East Boston End

42,000 bbl. of cement, and more than 1,000 tons of steel reinforcing rods; 1,800 tons of heavy steel for girders and columns were fabricated and erected and 130,000 ft. of saturated fabric for waterproofing the structure was laid. Included in this underground structure is a completely equipped car shop, fitted with all the necessary tools and appliances for making repairs to the cars.

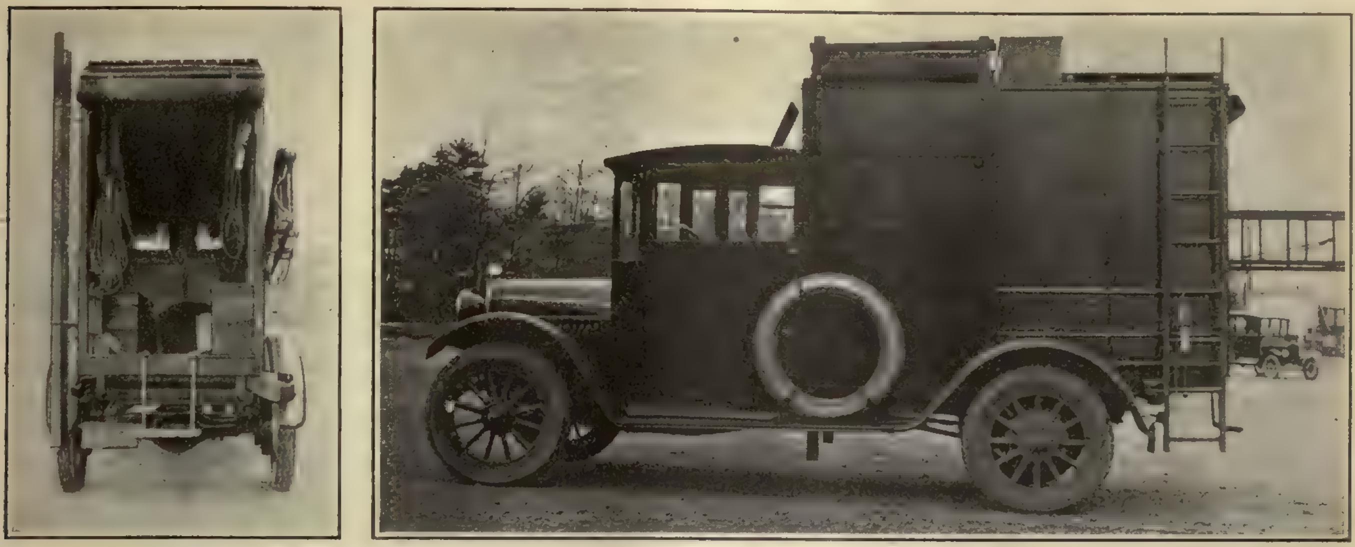
As the Maverick Square terminal station neared completion the problem of making the change-over from trolley car operation to third-rail trains had to be solved by officials of the railway. This involved the raising of all station platform levels to a height of 3 ft. 6 in., or on a level with the floors of the new subway cars. It involved the installation of third-rail construction for double tracks, the entire length of the tunnel. It involved the removal of old guard rail, and the placing of new. It involved the installation of an entirely new block signal system with automatic emergency stop devices. All special work had to be replaced to accommodate M.C.B. flanges. And the whole job had to be done in the shortest possible time, as this tube provided the only convenient means of transportation to thousands of suburbanites in their daily travel to and from the business section of Boston. To interrupt this traffic even for a day would have involved serious consequences. Ordinarily a week's work would have been required to do this job. But a week simply could not be spared. Accordingly a most carefully laid out and elaborate plan was devised by General Manager Edward Dana, Harry M. Steward, superintendent of maintenance and other officials, in collaboration with the Boston Transit Department.

Saturday, April 19, was a legal holiday, Patriots' Hill Day, in Massachusetts. The plan involved suspending operation of the tunnel by trolley cars at 8:30 p.m. Friday, April 18, and resuming operation with third rail trains Monday morning the 21st. And incredible though it may seem this plan went through on schedule, with a few hours to spare.

As that last trolley car made its way through the tunnel, Friday night, it was followed by construction cars, loaded with men, tools, equipment and material. Inside of fifteen minutes the tunnel became a hive of activity, apparently confused, in reality so well ordered and supervised that about 50 hours of stupendous effort wrought the entire change without a hitch. Gangs at each of the four stations en route threw up temporary wooden platforms to the new level. Other gangs set to work with acetylene torches cutting up and removing the old Z-bar guard rail—20,000 ft. of it in 23 hours. Rail cars followed and picked up the pieces. Third-rail insulators had been placed in advance with third rail laid alongside and bolted up. Now it was picked up and laid in place on the insulators. Special work to the extent of 340 ft. was cut up and removed, and 724 ft. of new special work was installed. Elsewhere, signal crews were at work on the new installation.

In all a total of 1,525 men were employed, with a maximum of 780 on one shift, all in a tunnel 1.7 miles

Where Surface Cars Enter Maverick Square Station—Rapid Transit Tracks Are Parallel and Outside Columns



Emergency Tower Truck of Middlesex & Boston Street Railway

As shown at the left, the interior of the body provides a warm and comfortable place for linemen to ride. Note the portable light hanging on the right-hand side. The inclosed cab which is shown in the view at the right protects the driver from inclement weather. Communication with men working on the tower is provided by an opening in the roof.

long. Twelve-hour shifts were worked; 2,185 meals were served to the men while on the job. Only two trifling personal accidents were reported during the whole period.

At 1 a.m. Monday morning Mr. Steward told the operating department they could have the tunnel. Power was turned on the third rail, the motorman of a waiting train turned on his controller and the first rapid transit train rolled down through the hole. Others followed, as the transportation and equipment executives hastened to break in their men during the two or three short hours left before the rush of Monday morning commuters was upon them.

The new cars used in the tunnel are unique in that they are always operated in units of two, or multiples of two, with control equipment on one end only of each car. They were built by the Pullman Company and are each equipped with four Westinghouse 514-E motors with Westinghouse electro-pneumatic variable load brakes. Other details of their construction and equipment were described in the ELECTRIC RAILWAY JOURNAL for Jan. 12, 1924.

The personnel of the Boston Transit Department which handled the engineering and construction of the Maverick Square station consists of Colonel Thomas F. Sullivan, chairman, formerly well known as a street railway man and later Commissioner of Public Works, city of Boston; Louis A. Rourke, formerly a division engineer on the Panama Canal and later Commissioner of Public Works, city of Boston; and Francis E. Slattery, a Boston lawyer. Ernest R. Springer is chief engineer.

An unusual degree of co-operation existed throughout the work between the Transit Department and the Boston Elevated Railway. A further remarkable degree of co-operation was enjoyed from the 1,500 men who labored day and night through a public holiday and Sunday to accomplish this remarkable achievement. Their pride was aroused to win and they did.

Tower Wagon for Line Repair Has Inclosed Body

Truck Used by the Middlesex & Boston Street Railway for Emergency and Light Overhead Construction Work Embodies Several Novel Features

MAKING repairs to overhead wires is a cold job in New England in winter. Not the least disagreeable feature of this work is the trip to the place where repairs are to be made. With this in mind the Middlesex & Boston Street Railway, Newtonville, Mass., recently purchased a Reo speed wagon chassis and built for it a special inclosed body, with a closed cab for the driver.

This company operates more than 100 miles of route, of which about 68 per cent is single track. As this is protected by signals and equipped with electric track switches and a private telephone dispatching system there is frequent need for a light emergency line wagon. The truck is operated by a crew of three men, all of whom have licenses to drive. One is a first-class signal, telephone and electric switchman. Another is a first-class lineman, and the third is an all-around helper.

The body was built in the Waltham shops of the rail-

An Emergency Wagon with Inclosed Body Built by the Middlesex & Boston Street Railway. Tool Boxes May Be Opened from Either the Inside or the Outside way. Its framework is of oak, while the sides are of ⅞-in. North Carolina pine. Over this has been placed a canvas cover which is painted bright red. The closed cab and closed body on this truck provide a warm and comfortable place for the men to ride to work and protect the tools and equipment from the weather.

Materials used in making line repairs are kept in boxes inside of the truck body. Easy access to these boxes is provided by several openings, one on the inside and another on the outside so that the men can reach materials from the street. A portable light to be connected to the trolley wire hangs inside of the truck. This is of 56-watt size and has 25 ft. of cord with an automatic retriever for taking up the slack.

A tower which rises to a height of 14½ ft. above the ground slides on a trackwork of channel irons. Workmen reach the platform by a stationary ladder on one side of the body. An opening with a hinged cover in the roof of the driver's cab makes it possible for the men on the tower to communicate easily with the driver. On the roof of the body is a box in which the heavy tools used for tower work are kept. An extension ladder for use in locations where the tower cannot be used is hung from iron hooks on the outside of the body. The rear step is hinged so that it may be thrown back into the body when desired.

The chassis cost $1,450 and the body slightly less than $400, making a total cost for the vehicle of approximately $1,850. Experience with the operation of this truck for a few months' time indicates that it costs approximately 5 cents per mile to operate without including depreciation or insurance.

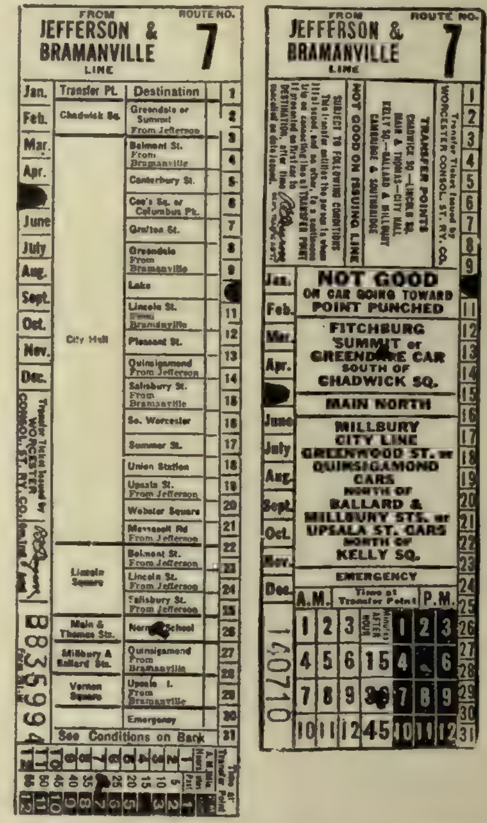
Simplified Transfer in Worcester

New Transfer Is Punched to Indicate Lines on Which It Is Not Acceptable—This Permits Grouping of Routes and Gives More Space for Other Features

INDICATION of the routes on which it is not good, instead of showing destination and transfer point, is the feature of a new form of transfer introduced by the Worcester Consolidated Street Railway, Worcester, Mass.. The point where the passenger boards the car determines the extent of the transfer privilege, hence the plan has been termed a "boarding-point" transfer system. While designed to prevent doubling back, the new type of transfer gives the passenger a greater degree of flexibility than the former one in that it does not restrict him to a particular line in order to reach his destination.

As may be seen from the accompanying illustration, the new transfer, like the old one, is a route transfer. However, instead of listing separately all the six transfer points and the 23 possible destinations for the line shown, the routes on which the transfer is not good are combined into three groups. This has made it possible to use much larger type and still keep the space for the route limitations down to half what it was on the old transfer. Part of the space gained has been used to print the conditions under which the transfer is issued, which formerly were on the reverse side. The space for time limit has been nearly doubled, and with a change from a 5-minute limit to a 15-minute limit, much larger type is used for the hours. Even with these changes the over-all size has been decreased from 2x7 in. to 2x6½ in. The space on the reverse side is used for printing the restrictions on issue and acceptance.

The routes on the system have been arranged in seven groups, for each of which a distinctive color of transfer has been adopted. This aids the conductor to determine the validity of a proffered transfer. The prepayment system is used and transfers are issued at the time of paying fare. In case there is a limitation of routes, which is determined largely by the point where the passenger boards the car, the conductor punches the proper block on the transfer. While the old form always required punching to indicate destination, the new form may be issued with only date and time indicated.


FROM
JEFFERSON & BRAMANVILLE LINE
ROUTE NO. 7
Jan. Feb. Mar. Apr. June July Aug. Sept. Oct. Nov. Dec.
Transfer Pt.
Destination
Chadwick Sq.
City Hall
Lincoln Square
Main & Thomas Sts.
Millbury & Ballard Sts.
Vernon Square
Greendale or Summit From Jefferson
Belmont St. From Bramanville
Canterbury St.
Coe's Sq. or Columbus Pk.
Grafton St.
Greendale From Bramanville
Lake
Lincoln St. From Bramanville
Pleasant St.
Quinsigamond From Jefferson
Salisbury St. From Bramanville
So. Worcester
Summer St.
Union Station
Upsala St. From Jefferson
Webster Square
Massasoit Rd From Jefferson
Belmont St. From Jefferson
Lincoln St. From Jefferson
Salisbury St. From Jefferson
Normal School
Quinsigamond From Bramanville
Upsala St. From Bramanville
Emergency
See Conditions on Back
Transfer Ticket issued by WORCESTER CONSOL. ST. RY. CO.
883599
Time at Transfer Point
FROM
JEFFERSON & BRAMANVILLE LINE
ROUTE NO. 7
Transfer Ticket issued by WORCESTER CONSOL. ST. RY. CO.
TRANSFER POINTS
CHADWICK SQ.—LINCOLN SQ.
MAIN & THOMAS—CITY HALL
KELLY SQ.—BALLARD & MILLBURY
CAMBRIDGE & SOUTHBRIDGE
NOT GOOD ON ISSUING LINE
SUBJECT TO FOLLOWING CONDITIONS
NOT GOOD ON CAR GOING TOWARD POINT PUNCHED
FITCHBURG SUMMIT or GREENDALE CAR SOUTH OF CHADWICK SQ.
MAIN NORTH
MILLBURY CITY LINE GREENWOOD ST. or QUINSIGAMOND CARS NORTH OF BALLARD & MILLBURY STS. or UPSALA ST. CARS NORTH OF KELLY SQ.
EMERGENCY
A.M.
Time at Transfer Point
P.M.
Minutes AFTER HOUR
15 30 45
140710

Left—The Old Form of Transfer Used by the Worcester Consolidated Street Railway. Right—The New Transfer, Which Is Punched to Indicate Where It Cannot Be Used

In addition to the various route transfers, a universal transfer has been provided. This lists the restrictions of all the route transfers. It is for use on special routes or when the regular supply of transfers is exhausted.

Should a passenger request a transfer to a line to which one could not be given the conductor would direct him as to how to reach his destination. Instructions governing such special cases are printed on the back of the transfer.

Since month and date are canceled at the office, the conductor has only to punch the time of arrival at the transfer point and, if needed, the line limit.

The new system applies to all of the 21 city routes and four in the county. On 12 of the city routes no restrictions govern transfers; the holder may ride anywhere on the system excepting back on the same line, hence only the time limit needs to be punched by the conductor. Retransfer privileges are not granted.

Bus Operating Results in Providence, R. I.

Total Figures for 1923 Show Only One Line of the Seven Made a Profit, Although Others Substituted for Rail Lines Show Less Loss than Rail Operation—Last Year the Company Ran Nearly 850,000 Bus-Miles with $200,000 Revenue

THE United Electric Railways of Providence, R. I., was among the early companies to take up the operation of buses in co-ordination with railway service. It has therefore had an opportunity to find out operating costs and revenue possibilities in various kinds of service, such as but few companies have as yet experienced. These figures are presented in detail herewith. They show an average revenue for all lines of 23.40 cents, an average operating cost of 26.01 cents and an average operating ratio of 110.16 per cent.

Only the bus operation on Broadway, where the buses handle the local service and street cars run express on the same street, is showing a profit, although the operation of some of the other lines, where buses have been substituted for rail service, may be said to show a profit in the sense that it is causing the company less loss in providing a necessary service.

This bus operation on Broadway was treated at length in an article in ELECTRIC RAILWAY JOURNAL for March 15, 1924, page 411. The various types of bus service in which the company has engaged may be briefly summarized as follows:

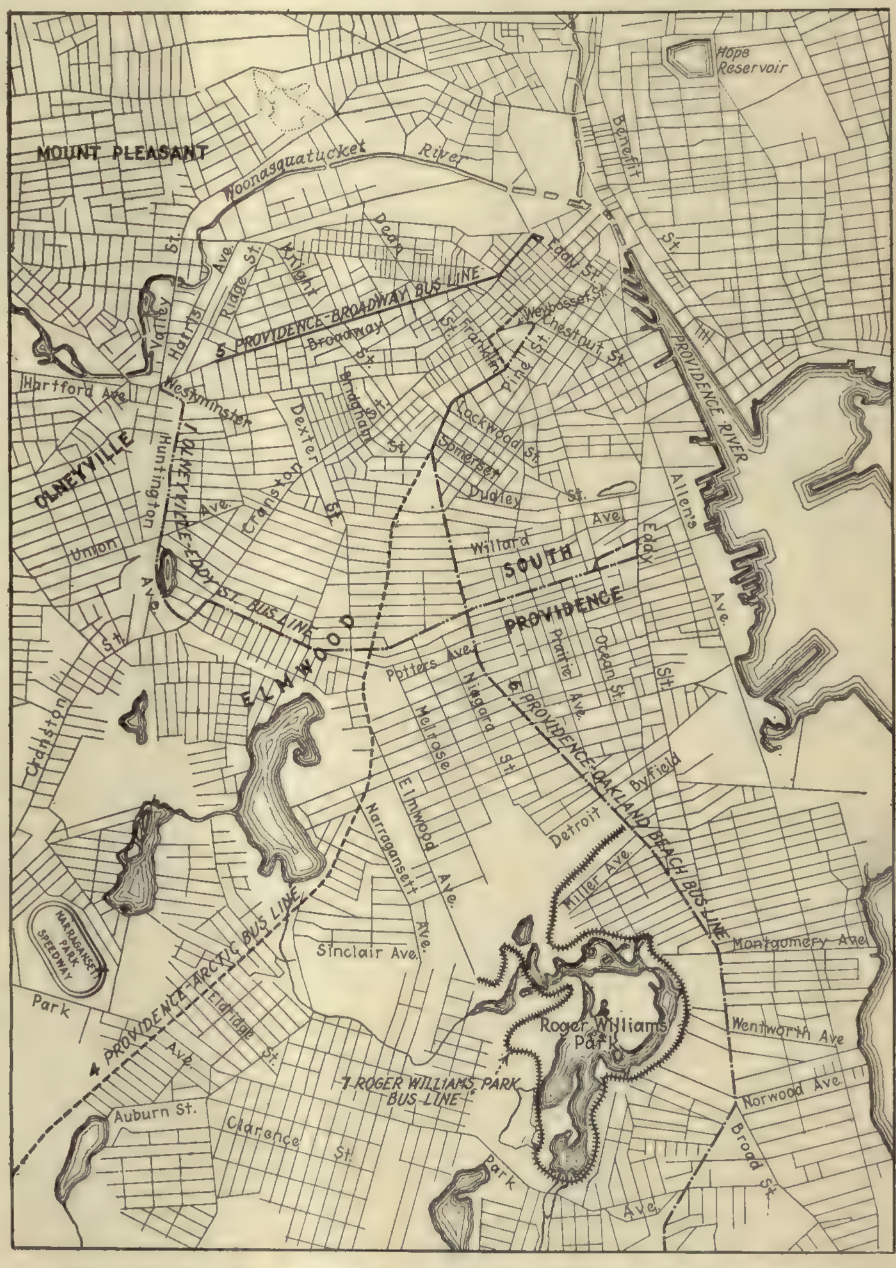
1. Olneyville-Eddy Street. This is a crosstown service which intersects eight rail lines, terminating at two of them. The line is 2.83 miles long. Two buses are operated in off-peak service and four during the rush hours. The corresponding headways are 30 minutes and 10 minutes.

2. Pawtuxet-Lakewood. This is a substitution of buses for a car line. The buses feed into the Broad Street car line. It represents a very large saving over the former operation of cars. The company was faced with renewing the tracks and substituted buses instead. The length of line is 1.16 miles and it is operated with one bus on a 30-minute headway.

3. Pawtuxet-Warwick Downs. This is a wishbone line with the Pawtuxet-Lakewood. The buses make one trip to Pawtuxet and the next one to Lakewood. This service to Lakewood is provided only in the summer time except for a tripper for school children in winter. The length of route from Pawtuxet to Warwick Downs is 1.29 miles and that to Lakewood 1.16 miles, as noted above. This line is in the nature of an extension of the rail lines and a feeder to it. It handles largely summer business. It is operated with one bus on a 30-minute headway.

4. Providence-Arctic. This is an intercity bus line extending from the business district in Providence, 11.26 miles, to Arctic. Three buses on a 30-minute headway are used in off-peak service and eight buses on a 10-minute headway in the rush hours.

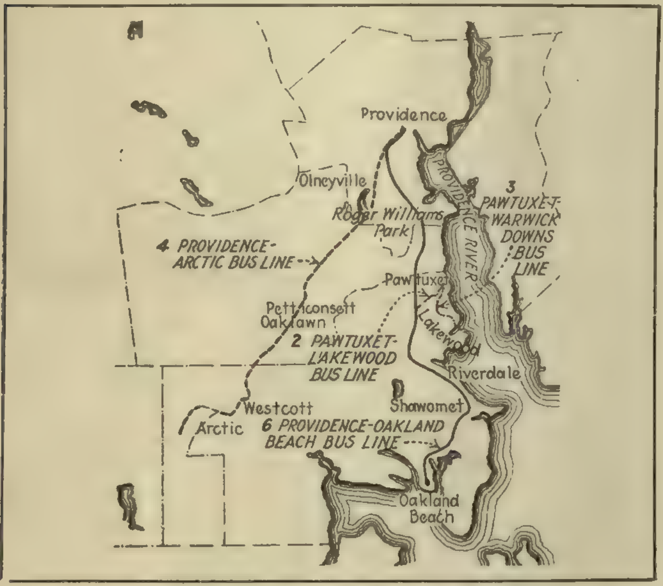
5. Providence-Broadway. This is tied up with the street car service on Broadway, the cars operating express and buses providing the local service. The length of the bus run is 1.35 miles. Five buses on a 5-minute headway are operated in off-peak hours and ten buses



Bus Routes Within Providence, Operated by the United Electric Railways. The Outlying Routes Are Shown in the Second Map on a 2½-minute headway during rush hours. The headway of street cars is 5 minutes.

6. Providence-Oakland Beach. This is an intercity line 11.62 miles in length with buses operated from the business district in Providence to the center of Oakland Beach. Two buses are operated normally on a 60-minute headway, with four in the heavy hours on a 30-minute headway.

7. Roger Williams Park. The service on this line has been abandoned, but it is included here because the operating figures for 1923 include the operations on this line. It was a park route 3.8 miles long which was essentially a pleasure ride and intended for operation during Sundays of July and August. The operation was started at the request of one of the park commissioners, anticipating that a large number of people would avail themselves of this service. The results were disappointing as indicated in the statement of earnings in an accompanying table.



In This Smaller Map the Outlying Bus Routes Operated by the United Electric Railways Are Shown

Up to the end of December, 1923, the company had 31 buses to supply the schedules noted above.

DETAILED STATEMENT OF EARNINGS AND EXPENSES EXPLAINED

The accompanying table of earnings and expenses for all bus operations of the Providence company for the year 1923 shows the full detail accounting followed by this company. The following comments tie in with this table by account numbers and are given to answer questions that naturally arise in one's mind upon examining this table.

12-A. The expenditure for removal of snow and ice was very low in 1923 and the company expects that this will be higher in the future. This expense will average about $3,500 in the city. The company operates over 21 miles of route on which the state will take care of the cost of snow removal.

24-A. The expense for buildings, fixtures and grounds set up in this table is a prorated amount of railway buildings, but it will be more in the future as the bus department now has a building of its own.

36-A. The item entered as garage equipment is really repairs to garage equipment.

40-A. Depreciation of buses is figured on a five-year basis, or approximately 200,000 miles.

INCOME STATEMENT FOR BUS OPERATIONS, COVERING THE TWELVE-MONTH PERIOD ENDED DEC. 31, 1923, UNITED ELECTRIC RAILWAYS COMPANY, PROVIDENCE, R. I.

		12 Mos. Ended Dec. 31, 1923	Per Bus-Mile, 12 Mos. Ended Dec. 31, 1923 Cents
	Operating Revenues:		
101-A	Passenger revenue, bus operation	$198,277.49	23.39
110-A	Station and car privileges (advertising)	1,050.06	0.12
116-A	Rent of bus equipment	4.00	.....
	Total revenue from transportation	$199,331.55	23.51
	Operating Expenses:		
12-A	Removal of snow and ice	$30.19	.....
24-A	Buildings, fixtures and grounds	879.86	0.10
	Total way and structures	$910 05	0.10
29-A	Superintendent bus equipment	$4,550.09	0.54
36-A	Garage equipment	21.21	.....
37-A	Shop expenses, bus department	1,164.24	0.13
38-A	Repairs, motor	27,130.95	3.20
38-B	Repairs, chassis	13,978.79	1.65
38-C	Repairs, body	2,569.44	0.30
38-D	Tire repairs and renewals	12,029.34	1.42
38-E	Miscellaneous bus maintenance	3,539.00	0.42
40-A	Depreciation of buses	29,237.65	3.45
	Total maintenance of equipment	$94,220.71	11.11
63-A	Superintendent bus operation	$10,134.70	1.21
78-A	Operators' wages	53,711.66	6.33
78-B	Garage employees	4,676.12	0.55
78-C	Garage expenses	1,033.31	0.12
78-D	Gasoline	26,746.40	3.15
78-E	Lubricating oils and greases	3,756.19	0.44
78-F	Miscellaneous bus transportation expenses	9,821.13	1.16
	Total conducting transportation	$109,879.51	12.96
80-A	Advertising buses	$729.39	0.08
84-A	Salaries and expenses of general office clerks	1,181.03	0.14
85-A	General office supplies and expenses	1.47	....
86-A	Law expenses	52.64	0.01
89-A	Miscellaneous general expenses	814.91	0.10
92-A	Injuries and damages	10,700.93	1.26
93-A	Insurance	448.76	0.05
94-A	Stationery and printing	402.76	0.05
95-A	Stores expense	1,268.74	0.15
	Total traffic and general and miscellaneous	$15,600.63	1.84
	Total operating expenses	$220,610.90	26.01
	Net operating revenue	*$21,279.35*	*2.50*
	Taxes	$1,673.98	0.20
	Net income	*$22,953.33*	*2.70*
	Operating ratio	110.68 per cent	
	Average passenger revenue per day	543.22	
	Revenue mileage	847,872	
	Revenue passengers carried	2,646,186	
	Gallons gasoline consumed	147,707.25	
	Miles per gallon gasoline	5.74	
	Gasoline cost per mile per gallon	3.15 cent	
	Investment, bus department, to Dec. 31, 1923:		
	Motor buses	$170,522.99	
	Elmwood garage	92,168.51	
	Miscellaneous	41,354.39	
		$304,045.89	

BUS LINE EARNINGS, MONTH OF DECEMBER, 1923, UNITED ELECTRIC RAILWAYS, PROVIDENCE, R. I.

	Earnings	Mileage	Receipts per Bus-Mile, Cents	Receipts per Bus per Da
1. Olneyville-Eddy St.	$2,117.64	7,096.79	29.84	33.15
2. Pawtuxet-Lakewood	75.80	1,200.24	6.32	10.95
3. Pawtuxet-Warwick Downs	56.45	810.88	6.96	13.31
4. Providence-Arctic*	7,673.68	31,329.83	24.49	66.20
5. Providence-Broadway	7,841.05	22,042.81	35.57	45.86
6. Providence-Oakland Beach*	3,859.90	21,336.94	18.09	39.36

BUS LINE EARNINGS, TWELVE MONTHS ENDED DEC. 31, 1923, UNITED ELECTRIC RAILWAYS, PROVIDENCE, R. I.

	Earnings	Mileage	Receipts per Bus-Mile, Cents	Net	Average Speed Miles per Hr.
1. Olneyville-Eddy St.	$17,704.57	64,872.84	27.35	$869.30	6.07
2. Pawtuxet-Lakewood	1,162.78	16,048.64	7.30	*3,002.71*	9.73
3. Pawtuxet - Warwick Downs	2,123.68	13,175.78	16.15	*1,299.14*	10.40
4. Providence-Arctic*	66,877.48	325,224.71	20.60	*17,594.66*	15.00
5. Providence-Broadway	48,631.23	152,482.33	31.90	8,981.21	7.73
6. Providence - Oakland Beach*	61,547.80	274,327.09	22.42	*9,848.34*	12.10
7. Roger Williams Park†	144.35	1,640.05	8.80	*282.26*	7.60

* Six zones, 5 cents per zone, minimum fare 10 cents, no tickets, no transfers.

† Discontinued.

Figures in *italics* indicate a deficit.

AVERAGE REVENUE IN CENTS PER BUS-MILE, UNITED ELECTRIC RAILWAYS, PROVIDENCE, R. I., FOR YEAR 1923

Name of line	(1)	(2)	(3)	(4)	(5)	(6)
January	27.67	9.08	9.78	20.18	.....	17.27
February	28.36	8.93	9.68	20.45	.....	17.28
March	28.16	9.82	6.89	20.17	.....	18.01
April	28.27	7.48	8.68	20.39	.....	19.36
May	26.37	7.08	11.42	20.20	26.65	23.38
June	27.01	6.29	11.81	19.70	29.35	26.63
July	26.24	6.23	19.78	18.15	28.79	31.06
August	26.00	7.07	25.25	18.22	29.68	30.76
September	25.65	7.22	17.45	19.33	32.17	23.06
October	25.51	6.09	6.62	21.18	34.32	18.68
November	27.99	5.77	7.25	23.51	35.32	17.11
December	29.84	6.32	6.96	24.49	35.57	18.09
Average	27.34	7.25	16.14	20.56	31.90	22.42
Average all lines			23.40			

1. Olneyville-Eddy Street
2. Pawtuxet-Lakewood
3. Pawtuxet-Warwick Downs
4. Providence-Arctic
5. Providence-Broadway
6. Providence-Oakland Beach

78-A. Bus operators' wages are the same as those for two-man car operation, namely, 61 cents an hour. The operation is not considered as difficult as that on one-man cars, where a slightly higher wage is paid the men, since no standing load is carried, and there is not as much congestion.

89-A. Miscellaneous general expenses are charged against the bus on an arbitrary basis, prorated according to mileage operated by cars and buses.

92-A. The charge for injuries and damages in the 1923 statement is considered by the company to be abnormally high, and this is expected to be about 1 cent per bus-mile in the future instead of 1.26 cents as shown in this statement.

In the investment details given at the bottom of the table, the item of $92,168 for the Elmwood garage includes $19,000 of stock and spare parts and miscellaneous supplies. It also includes machinery and equipment and a wrecking truck.

The entry for taxes includes the charge of $75 average per bus for a license from the State Board of Public Roads; the cost of bonding, which averages $120 per bus per year with a $50,000 maximum liability; a corporation tax of 1 per cent of the load, which goes to the state; the war tax included in the purchase price of twelve new buses, and a property tax in Providence, which amounts to $2.30 per $1,000 of assessed value.

Gasoline consumption by the various buses during 1923 was at the rate of 1 gal. for each 5.74 miles operated. This varied for different types of buses and under different service conditions all the way from 5.45 miles per gallon up to 8.80 miles per gallon. Most of the roads over which the buses are operated are level, the paving is good and little bad weather was encountered during the months covered in the statement.

Recorder Shows if Cars Make Safety Stops

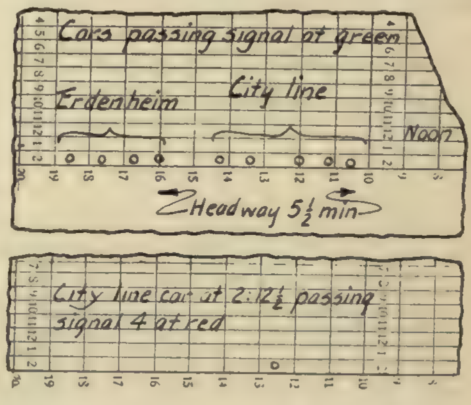
Automatic Block Signals and Headway Recorders Are Electrically Connected to Prevent Cars Running by Red Lights

TO INSURE that motormen shall not fail to make the required safety stops on a bad hill at the outer end of its Germantown Avenue line, the Philadelphia Rapid Transit Company has recently installed a system of Nachod block signals operated in conjunction with headway recorders. From Chestnut Hill to the city line, a distance of about three-quarters of a mile, there is a long winding grade, which is rather deceptive because it appears less severe than it really is.

Two shuttle extensions of line No. 23 use this track, one going to the city line and the other to Erdenheim, the latter branching off Germantown Avenue and Hillcrest Avenue. Both lines operate one-man cars. Formerly, there were six safety stops located equally distant along the Germantown Avenue grade. It required careful supervision to see that these safety stops were always observed, and six blocks of automatic signals have now been installed to insure the taking of the required safety precautions.

Each block has a two-indication signal, showing a red light normally which must be changed to green in the sight of the motorman before his car passes the signal and enters the block. Opposite the signal there is a setting contactor, and about 100 ft. before reaching the signal is a preliminary contactor. The setting contactor for one block acts as a clearing contactor for the block behind. When the trolley wheel of a car passes under the preliminary contactor, the motorman is only about 50 ft. away from the signal. Passing the contactor starts a time relay in operation, so that 5 seconds later the signal changes to green, unless there is a car already in the block ahead. The motorman must, therefore, bring his car to a stop in order to see the signal appear green before he passes. As soon as he passes the signal, the trolley wheel of his car changes it back to red again, the normal indication. So long as there is a car in the block, the signal cannot be changed to green. Thus, it not only serves as a safety stop, but also gives rear protection.

Two - Indication Normal Danger Signal Used by the Philadelphia Rapid Transit Company on a Steep Grade



Cars Passing Signal at Green Record on One Side of the Sheet and Cars Passing at Red on the Other Side

A Nachod automatic headway recorder is connected to each of the signals, so that a motorman cannot pass by a red light without that fact being recorded. All cars passing the signal at green register on one side of the record sheet, while all cars passing the signal at red register on the other side. The chart is renewed daily, and shows the exact time that proper and improper passages were made. The motorman must either make the stop or report not having done so.

Chicago Adopts New Form of Time-Table

The Surface Lines Give All the Information About Each Run in One Place on the Time-Table, so as to Make It More Easily Read

THE Chicago Surface Lines has had in use for a little more than six months a form of carhouse time-table in which the figures and other data for the entire day's run of each crew can be found in one place. The purpose of this arrangement is to make it easier for each man to understand his day's work, because he can see at a glance his time of arriving and of leaving each terminal and the terminal to which he should go on each trip. By reference to a table of running times in the lower part of the time-table he can also tell the exact time required for arriving at each intervening time point. This form of schedule is considered by the transportation department of the company preferable to the more common form, for the reason set forth, namely, because it enables each trainman to focus his attention on a single rectangular space on the blueprint. Indeed, a regular man could be given simply a section cut from a schedule blueprint.

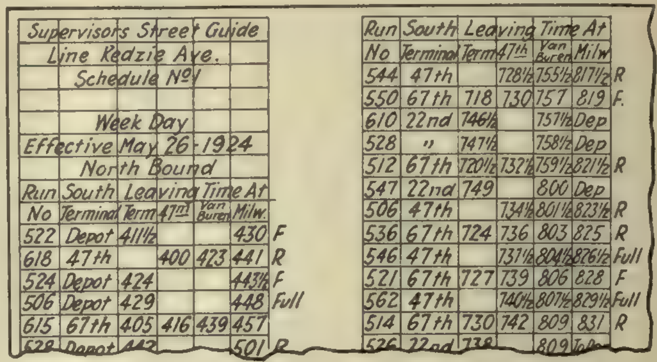
The large illustration shows the upper part of such a time-table, giving the details of four of the fifty-eight runs in division No. 7 operating out of the Kedzie Avenue depot, and effective for week days beginning on May 26, 1924. Where a line is operated from two carhouses, two run guides are prepared, one for the runs out of each carhouse. The form of the time-table, as shown, is so simple that practically no explanation is required, except in regard to the method of indicating the pay hours. The hour in Chicago is divided into ten parts, and in the run guide the pay hours are expressed in hours and tenths. The division office has the detail of this pay time, showing the time per piece, the various allowance and overtime, time of beginning and ending work, etc., in summarized form.

The form of the time-table drafted for the supervisors, i.e., the uniformed inspectors, is somewhat different. This time-table, known as a "supervisor's guide," is arranged according to the times the cars are scheduled to pass the principal time points on each route. This time-table shows for each run number the terminals of that run for each trip and the time the car is due at two or more of the major time points. The running time between these major time points and the time points of lesser importance is so well known to a supervisor that he can interpolate very readily if he needs to do so. The supervisor's time-table is blueprinted with blue numerals on a white background rather than in the usual form of white letters on a blue background, so that he can make any notes on it which he desires.

The experience of the company shows the great desirability of preparing time-tables for supervisors rather than the more common practice of allowing them to make up their own form of time-table from the run guides posted in the carhouse. To quote only one advantage, it economizes their time when a change in schedule is made, because the running time has to be figured only once for the entire corps of inspectors.

Another outstanding feature of the schedule department of the Chicago Surface Lines is the use of a fairly large number of running times during the day. Thus on some lines there are from six to eight running times between 6:30 a.m. and 6:30 p.m. With the individual form of time-table, however, these changes in running times should not confuse the trainman. He can tell directly from his time-table the time he is expected to arrive at the terminal on each trip and then can govern himself accordingly.

Another feature of the schedule department of the Chicago Surface Lines is a readiness on the part of the department to change the running time between time points, where changes in street conditions indicate that existing running times are either too fast or too slow.



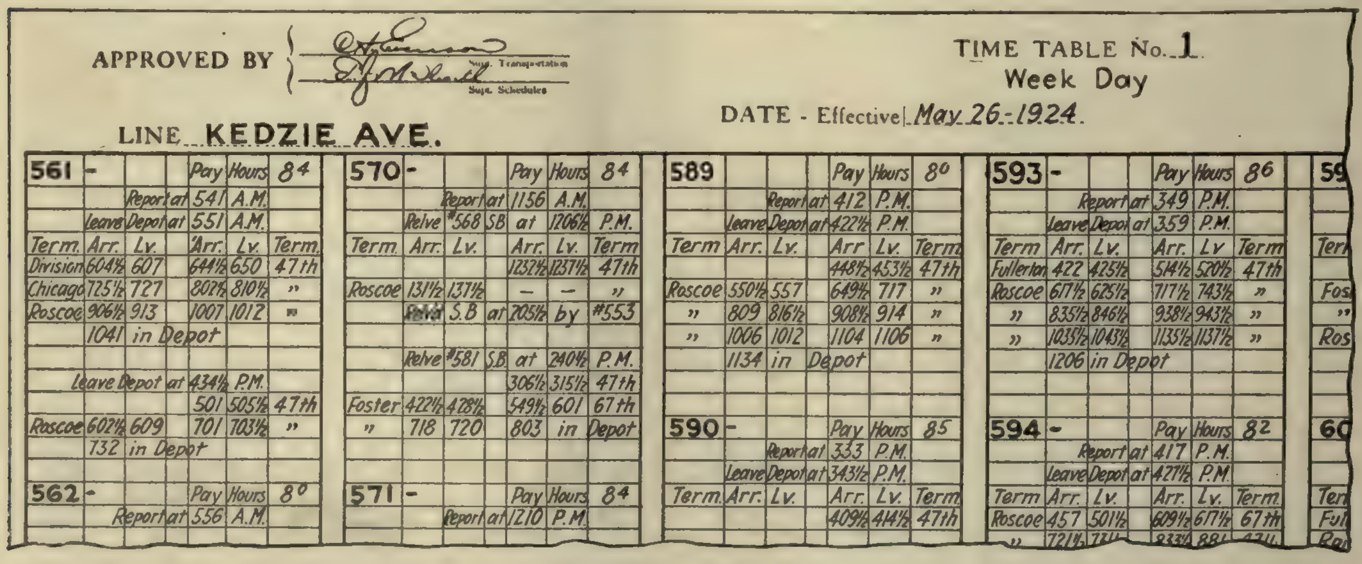
Supervisors Street Guide
Line Kedzie Ave.
Schedule No 1

Week Day
Effective May 26-1924
North Bound

Run	South	Leaving	Time	At		
No	Terminal	Term	47th	Van Buren	Milw.	
522	Depot	411½			430	F
618	47th		400	423	441	R
524	Depot	424			443½	F
506	Depot	429			448	Full
615	67th	405	416	439	457	
	Depot				501	R

Run	South	Leaving	Time	At		
No	Terminal	Term	47th	Van Buren	Milw	
544	47th		728½	755½	817½	R
550	67th	718	730	757	819	F.
610	22nd	746½		757½	Dep	
528	”	747½		758½	Dep	
512	67th	720½	732½	759½	821½	R
547	22nd	749		800	Dep	
506	47th		734½	801½	823½	R
536	67th	724	736	803	825	R
546	47th		731½	804½	826½	Full
521	67th	727	739	806	828	F
562	47th		740½	807½	829½	Full
514	67th	730	742	809	831	R
	22nd			809		

Upper Part of a Supervisor's Time-Table



APPROVED BY
Supt. Transportation
D. J. McNeil
Supt. Schedules

TIME TABLE No. 1
Week Day
DATE - Effective May 26-1924.

LINE KEDZIE AVE.

561	-			Pay	Hours	8^4
		Report	at	541	A.M.	
	leave	Depot	at	551	A.M.	
Term.	Arr.	Lv.		Arr.	Lv.	Term.
Division	604½	607		644½	650	47th
Chicago	725½	727		802½	810½	”
Roscoe	906½	913		1007	1012	”
	1041	in Depot				
	Leave	Depot	at	434½	P.M.	
				501	505½	47th
Roscoe	602½	609		701	703½	”
	732	in Depot				
562	-			Pay	Hours	8^0
		Report	at	556	A.M.	

570	-			Pay	Hours	8^4
		Report	at	1156	A.M.	
	Relve	#568	SB	at	1206½	P.M.
Term.	Arr.	Lv.		Arr.	Lv.	Term
				1232½	1237½	47th
Roscoe	131½	137½		—	—	”
	Relvd	S.B	at	205½	by	#553
	Relve	#581	SB	at	240½	P.M.
				306½	315½	47th
Foster	422½	428½		549½	601	67th
”	718	720		803	in	Depot
571	-			Pay	Hours	8^4
		Report	at	1210	P.M.	

589				Pay	Hours	8^0
		Report	at	412	P.M.	
	leave	Depot	at	422½	P.M.	
Term	Arr.	Lv.		Arr	Lv.	Term
				448½	453½	47th
Roscoe	550½	557		649½	717	”
”	809	816½		908½	914	”
”	1006	1012		1104	1106	”
	1134	in	Depot			
590	-			Pay	Hours	8^5
		Report	at	333	P.M.	
	leave	Depot	at	343½	P.M.	
Term.	Arr.	Lv.		Arr.	Lv.	Term.
				409½	414½	47th

593	-			Pay	Hours	8^6
		Report	at	349	P.M.	
	leave	Depot	at	359	P.M.	
Term	Arr.	Lv.		Arr.	Lv	Term
Fullerton	422	425½		514½	520½	47th
Roscoe	617½	625½		717½	743½	”
”	835½	846½		938½	943½	”
”	1035½	1043½		1135½	1137½	”
	1206	in Depot				
594	-			Pay	Hours	8^2
		Report	at	417	P.M.	
	leave	Depot	at	427½	P.M.	
Term	Arr.	Lv.		Arr.	Lv.	Term.
Roscoe	457	501½		609½	617½	67th

The Chicago Surface Lines Has Adopted a Form of Time-Table in Which the Run of Each Individual Crew Is Shown Separately

Radio Calls Emergency Crews in Detroit

This Arrangement Enables the Three Electrical Department Emergency Trucks, with Their Crews, to Be Used for Outside Maintenance Work When Not on Emergency Service

The Emergency Man at Work

SINCE March, 1922, the Department of Street Railways, Detroit, has been experimenting with radio reception as applied to emergency trucks. The first experiments were carried on by means of a Ford touring car, as described in the issue of this paper for June 3, 1922, page 910. In May, 1923, three emergency trucks were equipped with receiving sets so that any one or all three crews could be summoned to the point of any trouble where their services were needed. The broadcasting is done from police headquarters, through operators who also broadcast news of stolen automobiles, holdups, etc. The system, which has proved so successful in the case of the Department of Street Railways for emergency trucks, has also been applied with very good results, during the latter part of April of this year, to the Police Department's patrol cars, or "fliers" as they are commonly termed.

Before the radio sets were installed on the electric railway emergency trucks, the crews had to stay in their stations to be ready to answer emergency calls by telephone. The only exception was when work could be done in localities where telephones were available, or, as was done in several instances, the crews did outside work but reported at frequent intervals by telephone to the despatcher.

In case of trouble on the lines, the despatcher at railway headquarters would notify the nearest emergency crew. After it had attended to the trouble for which it was summoned, it would return to its station. All the time that it was away from its station (emergency or temporary), the crew had to be constantly in touch by telephone with railway headquarters to learn if the services of the truck were needed elsewhere.

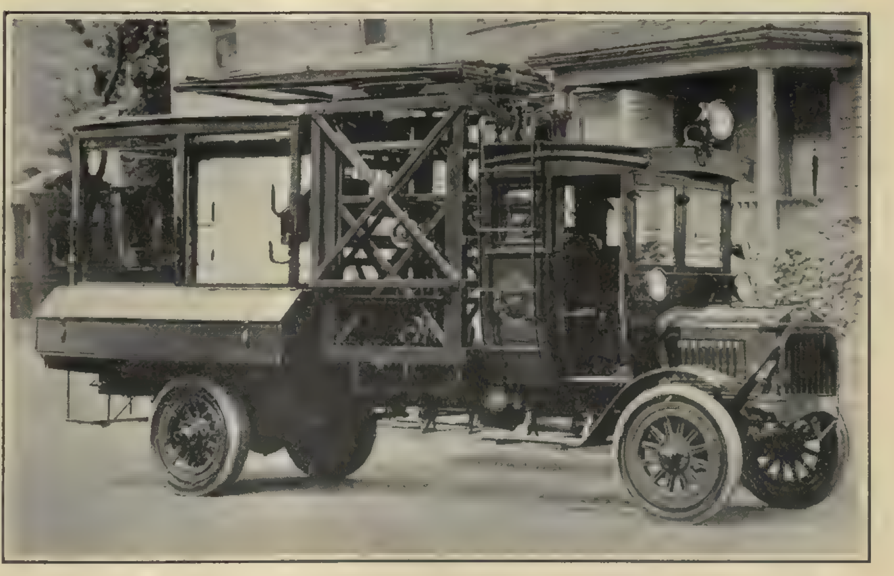
Radio has changed all this. Now any crew can be summoned at a moment's notice, no matter in what part of the city it may be. This permits the crews to do a great deal of miscellaneous outside work both in rehabilitation and maintenance, such as painting poles, replacing crossarms, cutting out annealing sections of trolley wire and substituting new, renewing worn-out ears, etc. It has been found that a great deal of this work can be done to better advantage at night than in the daytime. Thus, when poles are painted, particularly in the downtown district, there is no danger of spilling paint on pedestrians if the work is done at night, and it can be done more quickly. In renewing parts of the overhead construction, there is less traffic, both railway and vehicular, at night to interfere with the work.

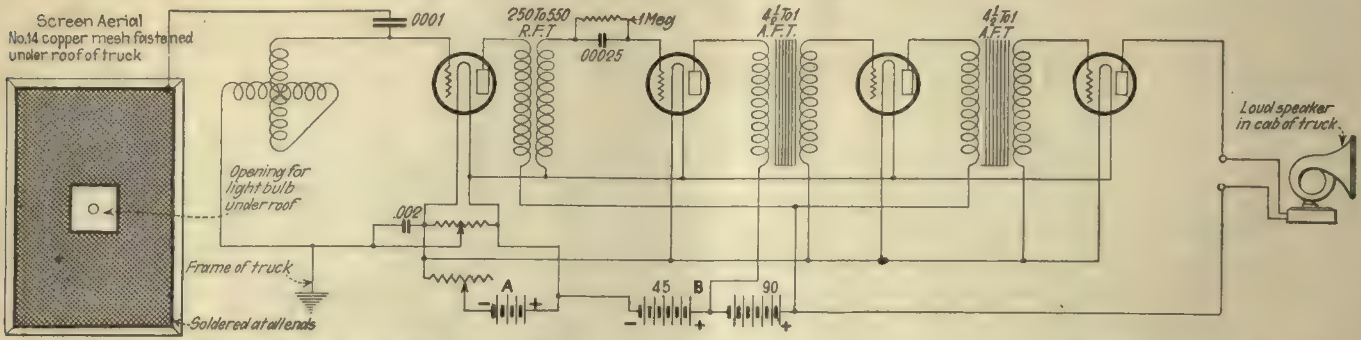
As explained, the radio messages are sent out through the broadcasting station at police headquarters. This station is downtown, about half a mile from the city hall. Whoever named the station must have had a sense of humor, because it is officially known as KOP. This station broadcasts on a 286-meter wave length.

When the plan of broadcasting to the emergency trucks was conceived, this station had authority only to broadcast music and police news. To summon an emergency crew, the practice at first followed was as follows:

CREWS CALLED BY MUSIC

When railway headquarters learned of a trolley break or other trouble requiring the services of an emergency crew the broadcasting station would be called (through a direct private circuit) and the broadcaster would put a piece of music on the victrola and broadcast it. All three crews then called the despatcher, who issued instructions appropriate for the occasion. In case one crew was sufficient for the trouble in hand, the other crews returned to their work. No attempt was made to pick and choose the type of music broadcasted except when KOP was broadcasting a musical concert, which it does occasionally. In that case the emergency crews only responded to one piece, viz., Sousa's "The Stars and Stripes Forever." Otherwise the music ranged from "Mama Loves Papa" to "The Tales of Hoffmann," depending upon the will and humor of the operator


These Emergency Trucks Are Told About Trouble by Radio



Hook-Up Diagram Used on the Emergency Trucks. Three of These Trucks Are Now Equipped with Wireless Receiving Sets

at KOP. Any amplification of this scheme which will call for a greater knowledge of music on the part of the crews obviously presents complications. It might make it necessary to require each member of an emergency crew to attend a recognized school of music.

Actual records with this wireless system of notification in Detroit show that the elapsed time between the receipt of a trouble call at railway headquarters and the report of a crew via wireless varies between three and nine minutes. The reporting by the crews is very materially expedited owing to the fact that they have access to the Police Department's telephones, located at frequent intervals along the main thoroughfares.

The expense to the railway department for this broadcasting service is the salary of one of the two radio operators. The broadcasting during this early period, or prior to April of this year, covered the period from 6:30 p.m. until 5 a.m., Sundays and holidays excluded.

SAVE $3,000 A MONTH

The direct gain to the railway comes from the amount of extra work which can be done by the emergency crews when otherwise they would be waiting in their stations. The record in May follows:

Number of radio calls to emergency trucks during May	30
Number of crew hours worked on line work by emergency crews who otherwise would have awaited calls at headquarters	822.5
Saving made due to these crews working all the time	$3,174.89
Maintenance and operation of radio equipment	250.75
Net saving	$2,924.14

Figures almost as good were obtained in earlier months.

The indirect advantage of keeping the men on the emergency crews busy instead of idle is undoubtedly also considerable, but is hard to evaluate.

Another feature of the practice with emergency crews is to rotate the crews among the different stations. In this way all the crews know all parts of the system. Incidentally, the foremen of the construction and maintenance crews are also rotated with respect to the crews, so that they learn to work with each other.

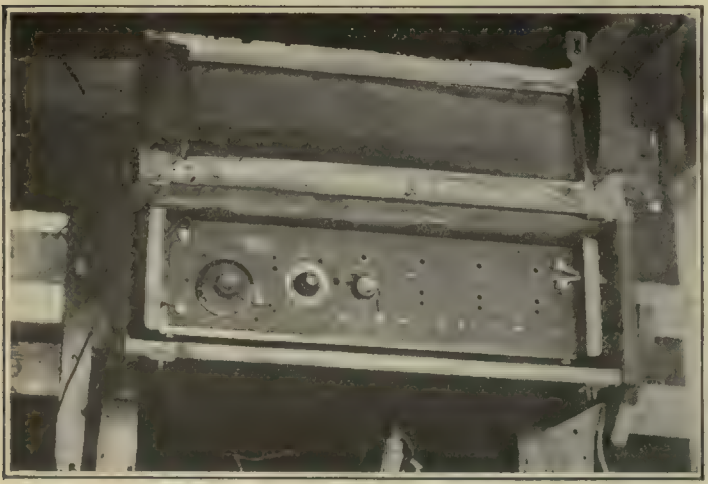
BROADCASTING PLAN CHANGED IN APRIL

As a check on whether the radio equipment was in service, it was the practice, prior to April, to run a test with a piece of music each evening at 6:30 p.m. The men would then report to the main emergency station at St. Antoine Street.

A change in the method of broadcasting had to be made in April under a ruling of the government that KOP had authority to broadcast music, but not when that music was used to notify utility crews that their services were needed. The department then tried broadcasting on 100 meters, but it was not satisfactory. Application was then made to the government to permit broadcasting for the summoning of emergency crews, and authority was finally granted by which a modified point to point broadcasting is now permitted. Under this plan, KOP, when it wanted to summon an emergency crew, broadcasted the emergency truck number and the type and location of the trouble, following this announcement with a victrola selection. The truck number, type and location of trouble were then repeated, followed by a victrola selection. KOP then signed off.

In June the plan was again changed by omitting the music, as it was found not necessary. The present plan, therefore, is for the broadcasting station to broadcast the information a few times and then sign off.

Altogether there are three emergency trucks, each



Receiving Apparatus Mounted on the Back of the Driver's Seat

This Is the Aerial Carried on the Emergency Truck having three crews on eight-hour shifts, the broadcasting since April, 1924, having been done each day, except Sundays and holidays, from 11 a.m. until 3 a.m. Later, it is expected that three shifts will be put into effect, i.e., the system will be worked for twenty-four hours a day.

It is further anticipated that ultimately the electrical department's six construction trucks, one fire truck and the track department's two emergency trucks may be equipped with radio apparatus. The department realizes that there are many other applications for such apparatus not yet developed, such as equipping snow plows, snow sweepers, etc. These will doubtless receive consideration at a later date.

RECEIVING APPARATUS ON THE EMERGENCY TRUCK

The receiving apparatus on the truck is placed horizontally in a box with a glass cover on the back of the driver's seat about midway between the floor and the roof. The aërial consists of a copper wire screen, attached to a wooden frame and mounted horizontally under the roof of the body, housing space being left for a "dome" light. The screen is made of No. 14 gage wire and is carried on a wooden frame about 4 ft. x 5 ft. The edges of this screen are soldered and the lead wire is soldered to the screen at one corner. The frame of the truck is used as a counterpoise. There are four tubes, one radio frequency, one detector and two audio frequency. For tuning, a variometer is used, and all condensers are of the fixed type. This apparatus is suspended on and surrounded by sponge rubber. Originally springs were used, but sponge rubber was found to be more satisfactory. The "A" battery consists of an ordinary 6-volt, 120-amp.-hr. automobile storage battery, of which there are five assigned to this work, one for each truck and two as spares. The batteries are charged once every four days. The "B" battery lasts about two months.

The loud speaker is of the Westinghouse type, carried under the hood in the cab. The "A" battery switch is also in the cab. The department does not depend on the crews to check the apparatus, but has an inspector to check it. The variometer is fixed at 286 meters, so that it will respond only to that wave length, which is the wave length of the station.

The hook-up used is fundamentally an Eisemann, but with some modification. A wiring diagram is shown herein.

Some difficulty has been experienced with interference from other broadcasting stations when the trucks are within a quarter of a mile of such stations. The intensity of the sound is reduced somewhat, also, when the truck is under a steel viaduct. No interference is noted when the truck is under trolley wires, but the set is inclined to be noisy when the truck is adjacent to overhead 23,000-volt transmission circuits, especially on wet days. None of these drawbacks is serious, however; they simply require closer attention on the part of the crews.

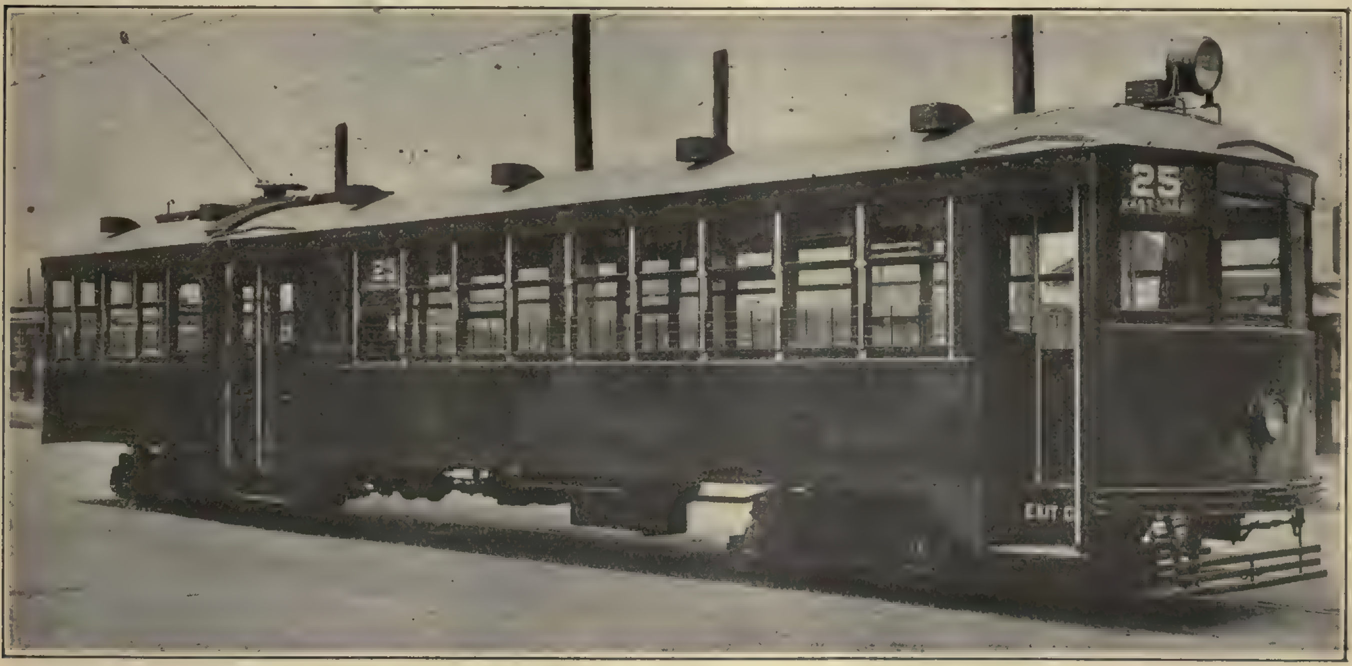
Double-Truck Cars Weigh 564 Lb. per Seat

New Side-Entrance Cars of the Birmingham Electric Company Are of Light-Weight Steel Construction and Seat 62 Passengers—A Unique Arrangement Is Made for Separation of the Races

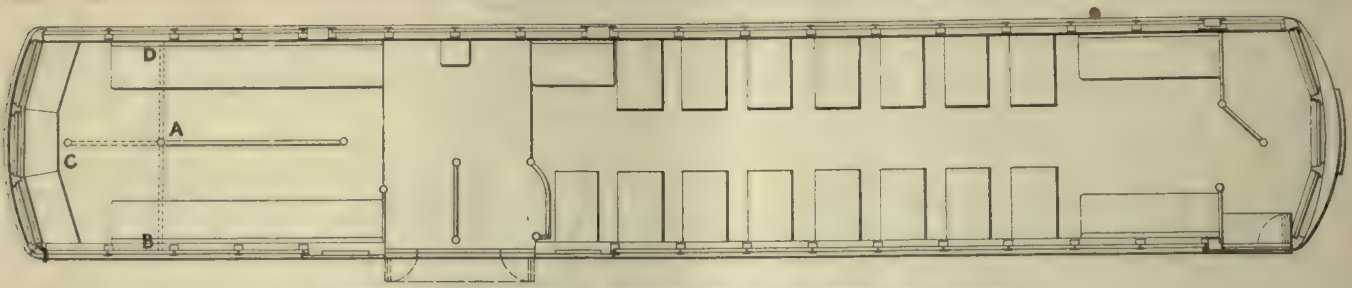
TWENTY new side-entrance steel cars were received and placed in service by the Birmingham Electric Company, Birmingham, Ala., during May. They are of the Cincinnati light-weight curved side construction, but differ from previous designs in that the stiffening panels are beside the center doors instead of being at the ends of the car. Seats are provided for 62 passengers. The total weight, including car body, trucks and equipment, is only 35,000 lb., or 564 lb. per seated passenger.

Each car is equipped with four General Electric No. 265 motors of 35-hp. capacity. A maximum gear reduction is used, giving the car a free running speed of 36 m.p.h. with very quick acceleration. The trucks are Brill 76-E with outside-hung motors. Cast-iron wheels of 26-in. diameter are used.

A special feature of the car is the seating arrange-



New Birmingham Side-Entrance Car Specially Designed for Separation of the Races



Floor Plan of Birmingham Car Showing How 62 Seats Are Provided

GENERAL DIMENSIONS

Length over all	49 ft. 5 in.
Length over dash	48 ft. 7 in.
Length of white compartment	25 ft. 5 in.
Length of colored compartment	14 ft. 0½ in.
Extreme width	8 ft. 5 in.
Height rail to trolley board	10 ft. 8 11/16 in.
Height from rail to side sill	2 ft. 4 3/16 in.
Window post centers	2 ft. 5 in.
Center door opening	5 ft. 0 in.
End door opening	2 ft. 5 in.
Truck centers	32 ft. 0 in.
Truck wheelbase	4 ft. 10 in.
Width of seat	36 in.
Width of aisle	25 in.
Height rail to first step, center	13 in.
Height first step to platform, center	10 in.
Height platform to car floor, center	7 in.
Ramp in platform, center	1 in.
Ramp in car floor, center	1 13/16 in.
Height rail to step, front	16 5/16 in.
Height step to car floor, front	14 in.
Ramp in car floor	2¼ in.

ment. In Birmingham a city ordinance requires the separation of the races inside the car and entering the car. To do this is made more difficult by the fact that the relative number of passengers of the two races varies greatly at times. Usually, however, the number of white passengers exceeds the number of colored passengers. For that reason the side door was placed toward the back, allowing approximately one-third of the seating capacity for the colored people and two-thirds for the white people.

All passengers enter by the side door. White passengers leave by the front door, and colored passengers by the same door through which they enter. The side doors are operated with National Pneumatic door engines, while the front door is manually operated by the motorman.

Normally the white section has 40 seats and the colored section has 22, but a more accurate adjustment of the seating capacity to suit the varying proportions of white and colored passengers is accomplished by means of stanchions and railings in the rear portion of the car. A swinging rail rotates around the vertical stanchion, located at *A* on the accompanying floor plan, and may be placed in any one of the three positions indicated as *B*, *C* or *D*. The amount of space available for colored passengers may, therefore, be varied from almost nothing to the entire rear third of the car. In the latter case this rail swings into a vertical position alongside the stanchions at *A*.

In This Car All Passengers Enter by Center Door. Colored Passengers Leave by Same Door and Whites by Front Door

The principal dimensions of this car are given in the accompanying table. Complete specifications were published in the ELECTRIC RAILWAY JOURNAL for March 8, 1924.

Many Benefits from Power Conservation

BY F. HOLLINGSWORTH

Supevisor of Power Saving San Diego Electric Railway

ASIDE from a 10 per cent saving in the consumption of power, instructions and training given motormen relative to power conservation have proved to be among the greatest factors in raising the standard of platform efficiency.

The words "platform efficiency" cover a wide range of operation, including numerous important factors other than the saving of power. When a motorman becomes interested in saving power, he naturally takes an interest in the operation of car motors, learning more about the proper transmission of power than he would do otherwise. The knowledge so gained has a tendency largely to eliminate the abuse of motors and other parts of the equipment by allowing the car to coast when possible. This tends to keep down the temperature of motors, and at the same time eliminates many hard brake applications, thus prolonging the life of motors and brake equipment.

It is noticeable that a reckless operator is seldom low on power consumption. The same applies in regard to accidents, as 90 per cent of our operators who run low on power also show a marked decrease below the average in the number of accidents, indicating that safety and the saving of power go hand in hand. The prevention of accidents is a very important factor in the saving of dollars and cents, and since the training a motorman receives in the conservation of power has a tendency to make him a careful operator, the benefits are many and far reaching.

While it is very difficult to evaluate the saving which Economy meters bring to the mechanical department, nevertheless they are there and are very much worth while. We have no definite figures at hand showing the saving made, but it must be apparent to all who are in a position to know that proper judgment in the use of power and brake applications means fewer turn-ins on account of motor trouble, fewer brakeshoe replacements and less liability of flattened wheels.

New Traffic Control Successful in Philadelphia

Installation of Master Signal Lights on the City Hall Tower Speeded Up Both Street Railway and Vehicular Movement, but Council Failed to Make Appropriations Necessary for Its Continuance

SYNCHRONIZATION of traffic movements on Market Street, Philadelphia, east and west of the city hall and on Broad Street north and south of that point was successfully accomplished for several weeks during May and June of this year by the installation of four master signals, one on each side of the city hall. This arrangement was part of a plan worked out by Gen. Smedley Butler, Director of Public Safety, to relieve congestion in the center of the city. While based in theory on the plan adopted some years ago for regulation of traffic on Fifth Avenue, New York City, the Philadelphia plan differed from it in a number of important details. The scheme was still in the experimental stage, but it had already resulted in an important increase in the speed of both street railway cars and other vehicles when the City Council brought it to an end on July 1, by failure to make necessary appropriations.

The plan called for the installation at a point about 350 ft. above the pavement of four 300,000,000-cp. searchlights, one on each face of the city hall tower. To obviate the necessity of those in the immediate vicinity of the city hall craning their necks to see the master light far up on the tower, a floodlight of 500,000 cp. was placed on each side of the building nearer the street level. Only one of the larger lights, that on the north side, was put in operation, but three more were contemplated. The four floodlights, however, were in place and were used for the regulation of traffic on the three other sides.

The master control signal consisted of only one light, orange red in color, and signals were given by turning on and off this single light. There were no other lights of different colors. This simple arrangement was possible because the primary function of the master light was to signal the traffic policemen rather than to signal the individual drivers of vehicles. When the red light was on, all traffic in both directions on the street in question stopped and the cross-streets were opened. As soon as the light went off cross-traffic had to stop and through traffic began to move.

An important feature of the plan was the latitude allowed to the individual policeman on the street. The time intervals of the master signal were necessarily based on the requirements of the heaviest cross-street. For that reason there were occasions at less important intersections when through traffic was stopped although no cross-traffic was waiting to move. In such cases, and in cases where there was waiting cross-traffic but no moving through traffic, policemen were allowed to exercise their discretion in order to speed up the movement.

Master Signal Lights on Philadelphia City Hall Keep Market Street Cars Evenly Spaced

Comparatively short time intervals were used on Market Street where the surface cars of the Philadelphia Rapid Transit Company operate. Somewhat longer intervals were used for the Broad Street signal. It was planned to regulate the searchlights by a mechanism made up of two disks. As the portions of these disks in relation to each other were changed, the lengths of time during which there would be light and no light were determined. These intervals could then be changed at will simply by removing the disks, and in fact it was the practice during the experiment to change the intervals several times during the course of the day to fit the needs of the situation at different hours.

The shortness of the intervals on Market Street was a contributing factor to the success of the scheme so far as it affected the street railway. Synchronized control resulted in keeping the cars separated into numerous small groups instead of allowing an accumulation of cars waiting to cross the busiest intersection as had been the case previously. Time intervals were arranged to fit the needs of this busiest point and the cars were "pushed across" as rapidly as before. Other cars, however, were held at intersections slightly less congested for a little longer time than might otherwise have been necessary, and were thereby prevented from creeping up and accumulating in large numbers at the most congested point. This phase of the operation of the new signal system is clearly shown in the accompanying illustration.

Under the new system, traffic movement was synchronized for 9 miles north and south on Broad Street and for 2 miles east and west on Market Street. As the Philadelphia Rapid Transit Company operates approximately 20,000 car trips through the downtown streets in the synchronized zone every day, extensive readjustment of car schedules was required. It is said that the westbound running time through the congested district on Market Street was reduced 10 minutes during the rush hour by the operation of the new plan.

General Butler explained the new system as being primarily a method adopted to avoid the necessity of installing expensive individual synchronized signals at many corners. To do that would require several years and cost $300,000. It was thought that the installation on the city hall tower of a single extremely powerful light which could be seen for miles would save the expense of many smaller lights at individual corners.

Several disadvantages to the plan as it developed during the trial resulted from the fact that the old hand semaphores which were formerly operated by traffic policemen at each intersection had been removed. It was difficult, therefore, for most of the traffic approaching an intersection to determine how to act. Only the drivers of those vehicles going in the direction of the city hall could see the master control light. Drivers going away from the city hall and drivers on the cross-streets could tell only by the actions of the policemen at the intersection what they were supposed to do. For this reason there was a certain amount of agitation for the restoration of the local semaphores.

Super-Highway Plan for Detroit Suburbs

These Highways Will Care for a Four-Track Rapid Transit Line and Express and Local Motor Ways

A SYSTEM of super-highways, each 204 ft. wide and extending from Detroit in all directions, has been recommended to the rapid transit commission of that city by its consulting engineer, Daniel L. Turner, and its engineer in charge, John P. Hallihan. The width of such a highway would be divided up as follows:

A central space of 84 ft. for the exclusive use of rapid transit lines on rails and the tree and shrub planting to screen it.

A 20-ft. roadway for express motor traffic on each side of the central space, making 40 ft.

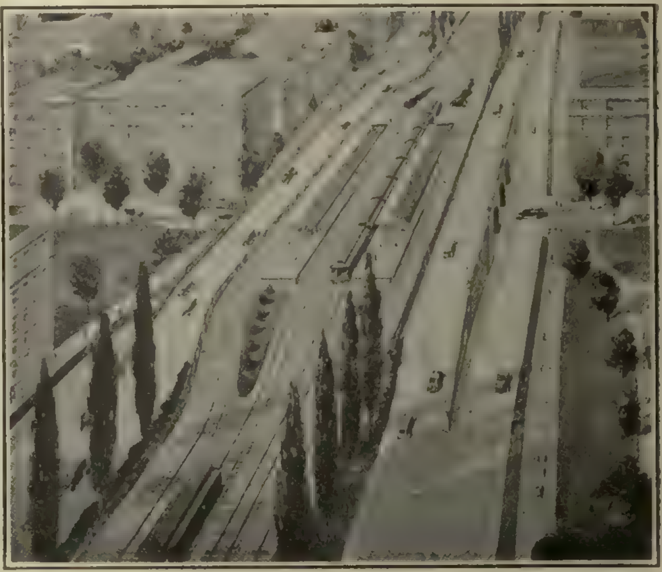
A 5-ft. planting or safety strip zone on the outside of the express roadway, making 10 ft.

A 20-ft. roadway for motor parking and local motor traffic on each side, making 40 ft.

A 15-ft. sidewalk on each side, making 30 ft.

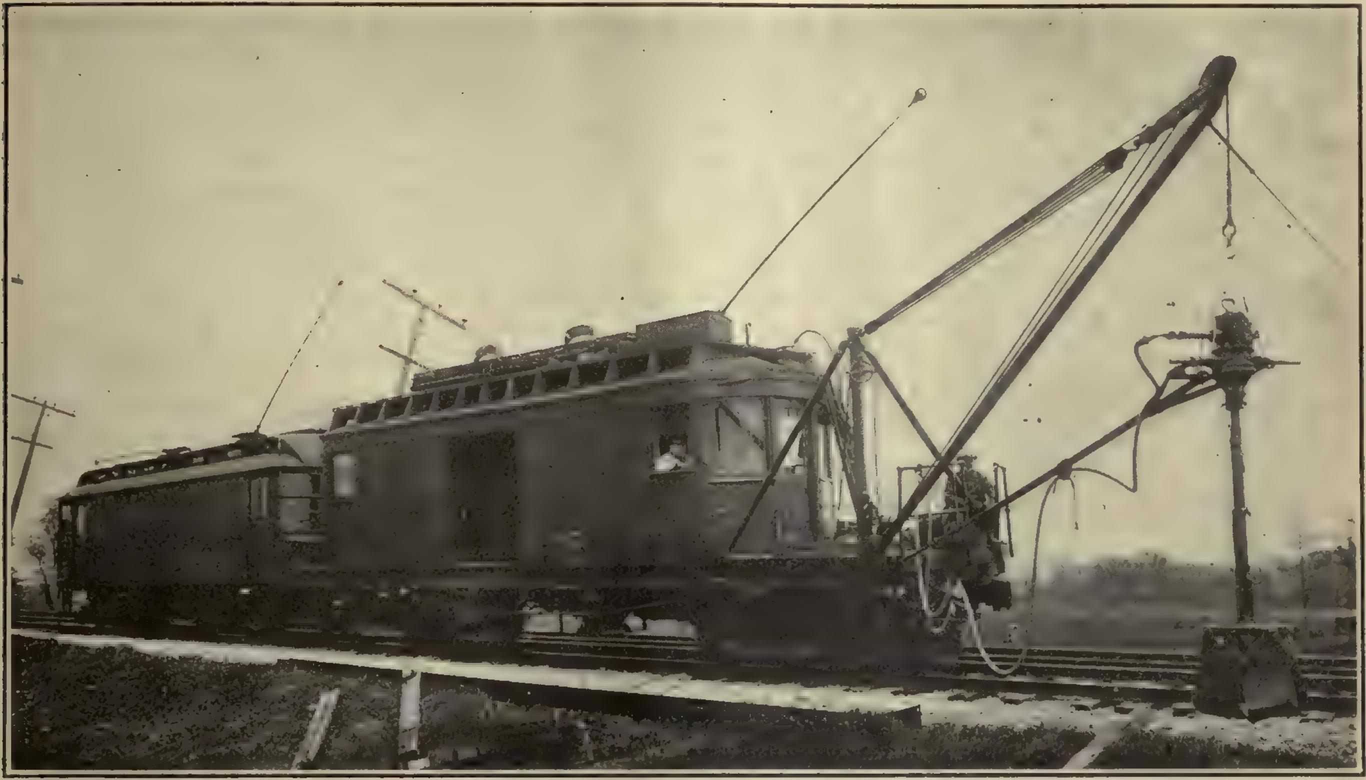
The engineers point out that Detroit is growing rapidly and the present transportation arteries are becoming inadequate to accommodate the demand. In 1950 the city will probably extend out 11 miles from the present center, and in the year 2000 it will have a radius of 15 miles. It is for sections which are now almost entirely outside the city that the proposed super-highway system is designed. On such super-highway two-track rapid transit lines are recommended at the start. There should be sufficient width for ultimately four tracks.

For the present built-up city sections, the cost of acquiring the necessary land for such wide highways would be prohibitive. Within these built-up sections the rapid transit lines would have to go underground, so as to cut the width of the thoroughfare to 120 ft., a width which will accommodate comfortably a four-track rapid transit line.


Arterial Highway for Greater Detroit

The report says that on Fifth Avenue, New York, where probably the densest traffic prevails, it has been estimated that the maximum capacity for a single traffic lane may be taken at about 600 motor vehicles per hour, with through traffic moving only about 42 minutes out of the hour. Similar observations made in Detroit on Woodward Avenue indicate a movement of about 440 vehicles per hour per traffic lane. But along one express motor traffic lane on a super-highway, with no crossing interferences and where the movement is continuous and at high speed, it has been conservatively estimated that 4,000 automobiles per traffic lane per hour can be accommodated. This is nearly seven times the capacity of a traffic lane of Fifth Avenue capacity and nearly ten times that of Woodward Avenue. This indicates what may be obtained by abolishing the intersection of cross-streets which, in the proposed plan, would pass under the highways at intervals of about ½ mile.

In submitting this report to Mayor Martin of Detroit, the rapid transit commission says that a special act will be necessary to make it legal as well as to provide means for financing the acquisition of the necessary land for the wide rights of way. The immediate need is not pressing, but the rights of way should be secured. Much of the property to be acquired is not within the present limits of Detroit, but the commission says it has received the utmost encouragement in its plan from the representatives of the various political subdivisions within the 15-mile circle of Detroit.



Apparatus Developed on the North Shore Line for Digging Holes. It May Be Converted Into a Machine for Setting Poles

North Shore Adopts Catenary Suspension

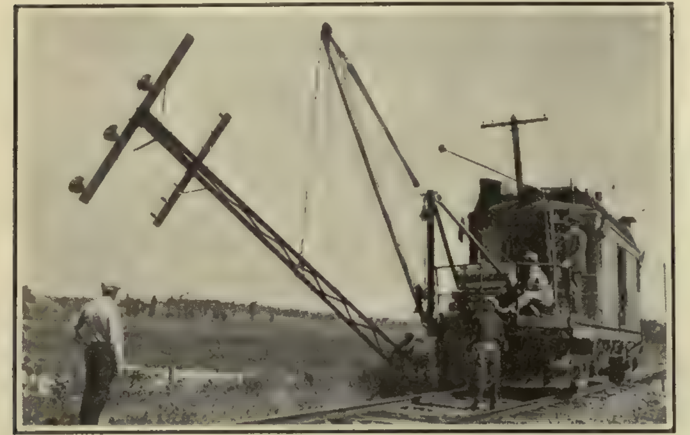
Each Power Line Pole Will Ultimately Be One Support of a Bridge—Use Made of Specially Rigged Line Car for Facilitating Work of Setting Steel Poles—Upon Completion of the Work Pantograph Trolleys Will Be Used on the Cars

BETWEEN Waukegan and Kenosha the Chicago, North Shore & Milwaukee Railroad is installing a 33,000-volt, 60-cycle, high-tension line, the poles of which will ultimately be used to support the catenary overhead trolley, which will become the standard type of conductor system for the road. This high-tension line became necessary in order to provide additional power facilities for the North Shore Line. It extends from a junction with the 132,000-volt line of the Public Service Company of Northern Illinois just north of Waukegan to the Kenosha automatic substation of the railroad. The three-phase line is carried on Bates 7-in. x 35-ft. poles, spaced at 180-ft. centers, set 10 ft. 8 in. from the center line of the southbound track. Each steel pole will be used as one support of a bridge from which will be suspended the catenary overhead construction. Following the completion of this type of overhead, the North Shore Line will adopt pantograph collectors.

In constructing this pole line, the electrical department of the North Shore Line made use of a specially rigged line car for digging the hole for the concrete foundation, and also for placing the pole on the foundation after it had set. Use was also made of a concrete mixer and train. The digging and hoisting outfit was developed by the electrical department and consists of an air-operated jib hoist from which is suspended an air-driven earth-boring tool. The construction of the hoist is particularly interesting inasmuch as it is collapsible and may be changed from one side of the car to the other. Steel tubing of two sizes is used for the compression members of the stationary part of the hoist, while a 1-in. rod with turnbuckle is used as the tension member. The main upright is of 5-in. tubing set in a socket at its lower end and braced by two 3-in. members at its upper end. These members are secured to the steel subframe of the car by bolts. The boom, which is a 20-ft. wood pole, is supported by block and tackle fastened to the top of the stationary upright. This tackle is hand operated.

The elevating hook is propelled by an air-driven winch mounted on the center line of the car near the end of the platform. A $\frac{3}{4}$-in. rope travels over three aligning pulleys on the stationary support and then over the pulley at the end of the boom. The air winch used is of 2,000 lb. capacity and was manufactured by the Sullivan Machinery Company. The air supply for operating the hoist is obtained from the car reservoirs, which are furnished with air from two 25-cu.ft. per minute air pumps. This outfit is capable of raising the pole into position with the crossarms, insulators and fittings all in place. These have been attached when the pole was on the ground by one man. If this was to be done after the pole had been set it would require two men on the pole and another on the ground.

When the outfit is used for digging, the boring apparatus is suspended from the hoist. The boring tool resembles a small orange peel bucket with the sections so designed that they serve as cutting blades. The tool is raised from time to time and by opening the jaws or sections the contents is discharged. The propelling mechanism is an air drill of large capacity supplied with air from the car reservoir and pumps. The boring tool was developed by the Grunter Manufacturing Company and is capable of drilling a hole in soft clay 2 ft. in diameter to a depth of 6 ft. in approximately 6 minutes. A "Y" shaped brace or torsion arm connects the handles of the suspended air drill with the car, in order to prevent the apparatus rotating during the digging operation.


The Pole Is Raised Into Position with the Cross Arms and Insulators in Place

When the line car is moving the jib boom is lowered and fastened alongside the channel side frame of the car. The upright framework is left up if more work is to be done in the near future. However, the frame is of such construction that it may be easily dismantled and stored in one of the longitudinal compartments of the car. The members are also designed so that it is possible to place the hoist on either side of the car. The air winch, being in a central location, serves both positions.

After the hole has been dug it is trimmed up by hand so that it will accommodate the rectangular wooden form into which the concrete is poured. A train consisting of sand, gravel and cement supply cars, together with a flat car upon which is mounted a steam driven 1-yd. capacity concrete mixer, furnishes the concrete. The chute on the mixer is of sufficient length to reach to the center of the opening of the form. The foundation extends 6 ft. below the surface of the ground and is brought up so that its surface is level with the top of the rail. Imbedded in the concrete are four 1-in. bolts 6 ft. long to which the Bates pole is fastened.

After the second line of poles is set on the opposite side of the right-of-way they will be joined with the present poles by two light steel angle members placed 23 ft. above the rail. This bridge will carry the catenary construction. A short section of the road near Milwaukee has already been equipped with this type of overhead.

The Readers' Forum

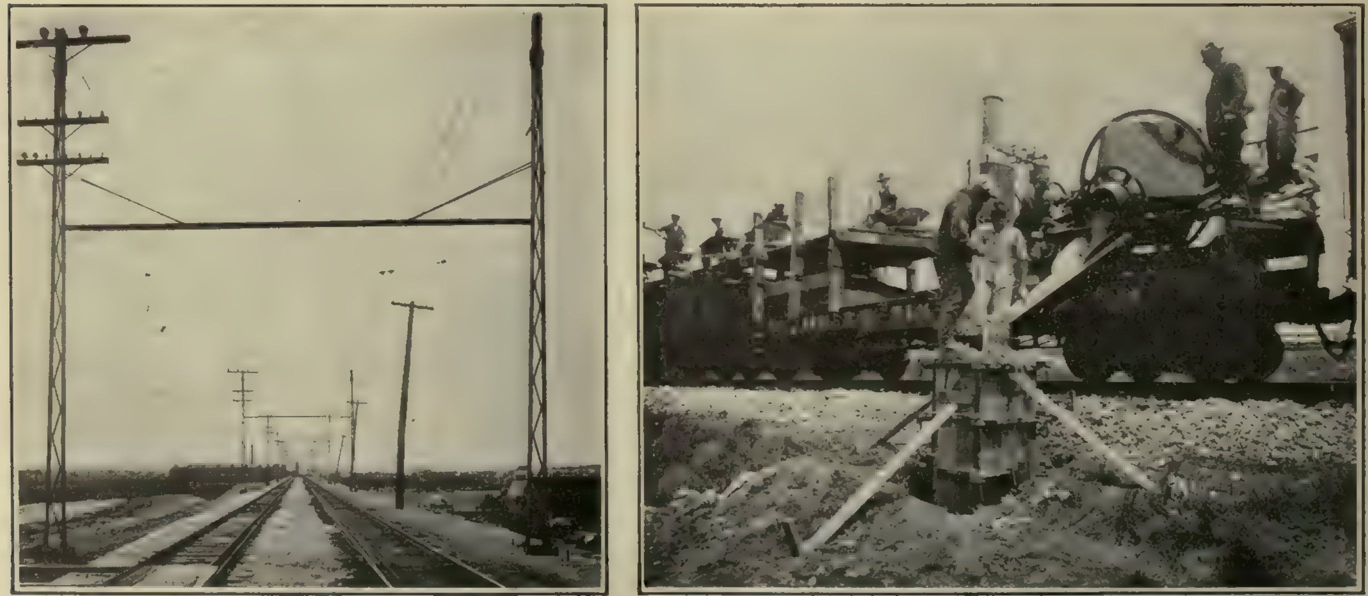
Taxicab, Bus and Railway Co-ordination

FORD, BACON & DAVIS, INC.
NEW YORK, July 7, 1924.

To the Editors:

The review of street railway traffic statistics for the period 1920 to 1923 inclusive in some of the cities in the United States having in excess of 100,000 population, written by J. F. Layng and published in your issue of June 28, shows in general a population increase with a decrease in revenue passengers carried. Of the 46 cities whose figures for 1920 and 1923 are listed, 33 show decreases in revenue passengers, and of the 19 cities between 100,000 and 250,000 population all but 3 show decreases in revenue passengers between 1920 and 1923. This decline in rail traffic is principally due to the operation of privately owned automobiles, and no one can now predict the end. The wholesale value of passenger automobiles and parts manufactured in the United States in 1922 was about $2,975,000,000. It is now probably the first industry in the country in value of products produced per year.

Although electric railway traffic is going backward, a study of transportation records, as I pointed out about a year ago in your paper,* shows that the passenger miles traveled per capita by the population of the con-


Left—Catenary Overhead Construction Will Be Carried on a Steel Bridge Which Connects Two 7-In. x 35-Ft. Bates Poles. This Will Ultimately Be the Standard Type of Construction on the North Shore Line. Right—Concrete for the Bates Pole Foundation Is Poured Directly Into the Form from the Mixer Mounted on a Flat Car Which Forms Part of the Concreting Train

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*See article by Mr. Davis in ELECTRIC RAILWAY JOURNAL, June 23, 1923, page 1035.—EDS.

tinental United States in all conveyances is rapidly increasing. This suggests that the electric railway industry should take a page from the book of the manufactured gas industry. Manufactured gas was founded as a lighting utility and flourished as such up to 1880. With the advent of the electric light it looked as if the gas industry were doomed, but the development of the use of gas for fuel not only saved the situation but enabled gas companies to reach heights that had never before been anticipated.

Street railway companies were not organized simply to engage in a part of the street transportation business, but to carry *en masse* any passengers seeking public conveyances from any place to any place. They have had this obligation from the beginning and now have it.

Fewer advances have been made in this business during the twenty years just ended than have occurred in almost any of our other basic industries. Owners have not seemed to realize that the laws of change, growth and extension prevail here as elsewhere. Imagine the continuance of the hansom cab of 1900 in the street-carrying business, in competition with the taxicab of today.

Transportation by water, roadway, rail and air is quite analogous in requirements and potential completeness to that in the blood circulating system. We have the trunk line arteries, the veins, the arterial and venous branches leading to special distribution centers and, most important, the capillary routes reaching the isolated individual points of destination.

In the early rudimentary organization of transportation a capillary system was not of great importance, but with the growth of the cities and city areas and changes in residence requirements individual rapid transportation to the ultimate location of the passenger has become a requirement. This necessitates the taxicab and bus service.

Rail roadways, owing to inflexibility in use, have from the first been lacking in special advantages for individual transportation and delivery. In not adopting other means for supplementing and extending this service to the extent of the complete requirements in delivery of the individual passenger, the industry has failed to grasp its opportunity as a universal street carrier.

In a general review made by the writer of the transportation facilities and requirements of 50 principal cities in the United States, each having a population in excess of 100,000, it appears that there should be in a co-ordinated street transportation service of taxicabs, buses and street cars, depending upon the type and size of city, approximately the following:

One 5-passenger taxicab, of present type, maximum capacity, to each 600 of population.

One 68-passenger bus of double-deck type, maximum capacity or equivalent to each 2,500 of population.

One double-truck 44-seat passenger express motor street car with trailers for peak periods or equivalent to each 1,000 of population.

The cities in question have a combined population (1920 census) of about 30,000,000, revenue street car passengers per annum of 7,000,000,000, transfer passengers 2,500,000,000 and revenue car-miles of 1,000,000,000.

Based upon a population of 30,000,000, the potential number of vehicles for the immediate future in this proposed co-ordinated service in the cities considered would be: Motor passenger cars, 30,000 with trailers; buses, 12,000, and taxicabs, 50,000.

The relative importance of the automobile and electric street railway industries is shown by the amount of money invested in each. The total present value of electric street railway property in the United States after all previous expenditures is about $6,000,000,000, whereas the yearly expenditure for automobiles and parts is approximately $2,500,000,000.

The comparative extent of service of passenger vehicles of each type is shown by the passenger miles per capita per annum of each. This, in 1922, was about as follows:

Steam railroads	427
Street railways	364
Taxicabs, buses and private passenger automobiles	786
Miscellaneous	46
Total	1,623

The ratios just given apply to the present relative status of the street transportation business. For the future, if present tendencies continue, there will be a marked readjustment as between roadway and rail vehicles.

Again I want to emphasize that the original purpose of the organization of street railway companies was not to engage in a part only of the street transportation business, but to carry practically all passengers seeking public conveyances. They should now, through new and old means of street transportation, regain their former position.

The present electric railway company in any city should not be content to undertake only transportation there by rail. The companies should, through new and old means, carry all passengers seeking public conveyances. As pointed out in the article in your issue of June 23, 1923, already mentioned, this would mean for the present electric railway companies:

1. The inauguration of a supplemental taxicab and bus operation, co-ordinated with the operation of the various lines of an express street car service.

2. The remodeling or supplementing of their roadways and equipment for express service.

3. The development of public sentiment in cities so that vehicular traffic on street-railway tracks will be lessened and limited through effective traffic regulations, particularly in congested areas, enabling reasonably high speeds by the street railway cars for the proper accommodation of the public.

4. The reorganization of their plans of operation.

This combination may save the situation for the taxicab, bus and street car services, which are at present, under independent operation, often triplicating a service for which they are not fitted and, through defective organization and resources, failing to earn a reasonable return on the respective investments.

GEORGE H. DAVIS.

Gaudy Seal Preaches Safety

A BRIGHT red and white sticker in the shape of a seal is used by the Union Street Railway, New Bedford, on outgoing mail. The words "Don't Get Hurt" are prominent in the design and the safety first idea is thus brought prominently to the attention of all local people receiving mail from the railway. The gaudy color of this poster stands out strongly in contrast to the color of the envelope, and attracts attention.

Association News & Discussions

Operating Problems with Electrification*

Various Methods and Practices Used in Handling Long Freight Trains on Heavy Grades with Electric Operation Were Reported on at the Annual Meeting of the American Railway Association

THE reports of a sub-committee appended to the report of the committee on electric rolling stock presented at the annual convention of the American Railway Association, Division 5, Mechanical, at Atlantic City, June 14, gave some information on the operating problems encountered in handling long freight trains under electric operation on heavy grades. The information presented was derived from the experiences of railroads in the United States on which electric traction in mountain territory has been in use for several years.

In each case the immediate results have been increased tonnage per train and increased train speed. These two things, whether brought about through the use of more powerful steam engines or with electric locomotives, produce certain problems. Communication between head and rear ends of trains will be more difficult and the slack action will be more pronounced. As a matter of fact, these features are more easily overcome in the case of electrification than under steam operation because electric locomotives produce a more uniform rate of speed and are subject to closer control.

In former years, when operating double-head or with pusher, it was the universal practice to signal by means of whistle blasts, but with the increase of train lengths this method became more and more unsatisfactory. The method now used in electrified territories of signaling with slack action through the train, produces a much smoother train operation.

There is no difficulty involved nor is there a serious burden placed on the operator in the control of trains on descending grades through regenerative braking; in fact, the operator's task is greatly lessened, for it is merely a matter of proper manipulation of his control, and he is always in possession of an additional factor of safety from the air brakes with a fully charged train line. The only existing problem is that of impressing upon the motormen the necessity for the same care to insure air brake operation as with steam operation.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY

The Chicago, Milwaukee & St. Paul has 647 miles of main line electrification. Two territories are involved, the first, which embraces the Rocky Mountain and Missoula Divisions, and the second, embracing the Coast Division. These two sections of electrification include practically all of the mountain grades of this railroad.

Helper locomotives are used on eastbound tonnage trains out of Cedar Falls, Kittitas, Avery and Butte yards and on westbound tonnage trains out of Piedmont, Haugan and Beverly of 2,500 tons. Trains are handled with one locomotive on the 1 per cent grade west bound out of Harlowton, and the train is doubled over the short 2 per cent grade between Bruno and Loweth.

In the operation of helpers, the helper locomotive is placed in the center of the train to equalize the tonnage as nearly as possible. This practice has been found desirable to eliminate excessive drawbar strain and to overcome derailments from the tendency of buckling the train.

The handling of tonnage trains on grades and curves with locomotives placed at head and middle of train has been satisfactorily accomplished by readily interpreted signals transmitted through the train. When starting a train, the lead locomotive begins to pull and the engineman of the second locomotive, when he perceives the slack going out, applies power to his locomotive, thus starting the rear half of the train and accelerating at approximately the same rate as the lead locomotive. If the electric pusher were to push the train up onto the lead locomotive and hold the train until the lead locomotive was ready to proceed, as is customary in steam operation, the electric equipment on the helper would be subjected to an unnecessarily and probably injurious overload.

In the electrified territories, there are numerous tunnels and many curves, making it impractical to depend upon hand or light signals entirely, therefore the following method was devised for testing brakes at the summit of grades before making the descent.

When approaching the summit of the grade, the train is permitted to stop of its own accord and the engineer on the leading engine makes a 10 to 12 lb. reduction of brake pipe pressure; this is noted by the trainman in the caboose, who in turn increases this brake-pipe reduction by gradually opening the brake-pipe valve in the caboose until a full service application is made, or a total of 20 or 25 lb. This gives assurance to all concerned that the brakes may be applied from either end of the train and are operative throughout.

The most necessary task in successfully operating freight trains is the control of the train slack in or out slowly and without severe shock. A correct understanding of this feature of handling and ability to control accordingly results in successful operation.

The time element is an all important element, and the control operations should not be hurried. This applies in starting, stopping or changing from motor action to regeneration, or vice versa. To stop freight trains successfully there should be no change in train slack during the time train brakes are applied as the slack should be run in before the train brakes are applied and engineer's brake valve manipulated in a manner that will result in slack remaining run in until the train is brought to a stop.

The current required to start a tonnage train, particularly on heavy grades, is high and the train should be brought up to speed as quickly as practicable (within 15 to 20 minutes), in order to prevent damage to the electrical apparatus, especially the resistance grids. It is also more economical to utilize the electrical energy for accelerating the train to the free running speed than to dissipate it in the resistance through which the current must pass while the controller is on the intermediate notches.

Special rules and instructions have been developed with the adoption of electric traction, many of which have resulted in better train operation.

When starting regenerative braking some care is necessary on the part of the engineman to avoid severe shock, due to train slack. The most practical and safe method of starting regeneration is to make a train brake application, and while this is effective make the adjustment of levers so that regenerative braking will start slowly to be effective, being governed by the speed and indication on ammeters as to the proper time to release the train brakes. The retaining valves then gradually leaking off their holding effect permits, regenerative braking to be gradually increased to full effect without undue shock to train and without causing line surges in trolley voltage.

Overheated and cracked wheels are almost unknown in the electric operated territory, trains making a continuous and unvarying movement from summit to foot of mountain grades.

NORFOLK & WESTERN RAILWAY

The electric operation of long freight trains on the Norfolk & Western consists principally of handling heavy coal trains at comparatively slow speeds over what is known as the Elkhorn Grade, crossing the Allegheny Mountains in McDowell County, W. Va. The service consists in hauling empties westbound from Bluefield to the coal fields, delivering them to the mines and hauling loads back over the eastbound grade and on to Bluefield, the eastern terminus of the electrification.

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*Abstract of report presented at the convention of the Mechanical Division of the American Railway Association, Atlantic City, N. J., June 14, 1924.

If a train of empties is to be delivered to the mines located on the descending grades between Coaldale and Northfork, W. Va., it is operated down the hill at a slower speed, approximately 15 m.p.h. regenerating. This allows the slack in the train to accumulate and bunch against the locomotive. Under such operation it is an easy matter to stop the train by use of the straight air brakes on the locomotive, regeneration ceasing after dropping below 14 miles per hour. In this way undesirable shocks and surges in the train are materially reduced. If a portion of the train is to be taken to Northfork or beyond, the speed from the last set off point, continuing westbound, is held at approximately 20 to 25 m.p.h. regenerating.

Frequently electric locomotives are used to double-head time freight westbound trains hauled by Mallet locomotives, the latter engines making the entire division run. In this case the electric locomotive is placed ahead of the steam locomotive, regenerating on the grade, holding the Mallet engine and train at approximately 20 to 25 m.p.h.

Under normal operation, there are, approximately, 2,500 tons of westbound loads assembled daily at Flat Top yard from nearby operations. These loads are picked up currently and handled by the electric locomotives in trains of empties, and are handled to the western terminus of the electrification.

OPERATION WITH HELPER LOCOMOTIVE

In starting it is customary for the lead locomotive to drop back against the train, bunching the slack against the pusher locomotive. As soon as this bunching of slack is felt at the pusher locomotive the engineman on the pusher begins to apply power, steadily increasing it until he has maximum accelerating current on the motors. The engineman on the lead locomotive, to whom this starting impulse is readily felt, reverses his locomotive and commences to pull. The lead locomotive thus takes up the slack, picking up the train, car by car, until the load has been sufficiently balanced between the lead and the pusher locomotive to accomplish an easy moving off of the train.

The locomotives are equipped with relays, which limit the current applied to the motors during acceleration and the engineman regulates the rheostats so that the current is kept up to this limit.

Approaching a stop signal, the engineman of the lead electric locomotive reduces speed, which results in the load building up on the pusher locomotive, and this is an indication to the engineman on the pusher that the engineman on the lead locomotive desires to stop and acts accordingly, by gradually reducing the power and speed developed by the pusher. In this way the pusher locomotive keeps the train slack bunched, which is in the interest of making a better start.

When the train has reached the summit and begins to descend the grade the load on the lead locomotive gradually decreases as the train passes over the summit. When approximately half of the train is over the summit the speed gradually increases until it reaches about 15 m.p.h., when regeneration comes into action. The uncoupling lever between the caboose and the pusher locomotive has by this time been lifted and as the train passes over the crest of the grade it leaves the pusher. The pusher drops back, crosses over to the westbound track and returns to the foot of the grade.

Under certain conditions, when the rails are wet and slippery, it is sometimes the practice to bring the air brakes into action while the locomotive is still braking by regeneration. When this occurs, the engineman makes a reduction of approximately 5 lb. in brake pipe pressure, which applies the brakes on the train, at the same time keeping them released on the locomotive.

BALTIMORE & OHIO RAILROAD

That portion of the Baltimore & Ohio Railroad which is electrified lies within the city limits of Baltimore and is a part of the so-called Belt Line, extending from Camden Station on the west to Waverly interlocking tower on the east, a distance of 3.75 miles. There are eight tunnels in this zone, together amounting to 48 per cent of the total distance, the longest tunnel, which is between Camden Station and Mount Royal Station, being 7,300 ft. in length. This part of the zone through which trains are handled by electric locomotives is entirely on a grade, the difference in elevation amounting to 150 ft. which gives an average through grade of 0.9 per cent, the ruling grade being 1.52 per cent and the maximum curvature 10 deg., 16 minutes.

The electric service in this territory is very similar to steam helper locomotive service, except that the road steam locomotives they might be helping furnish no assistance.

The present maximum rating for freight trains handled over the Belt Line is about 2,650 adjusted tons or approximately 2,300 actual tons, excluding steam locomotive, weighing approximately 255 tons.

The ruling grade in the zone is 1.52 per cent eastbound, while that of the remainder of the steam locomotive division to Philadelphia is but 0.8 per cent. This requires the electric locomotives to develop practically twice the tractive effort of the steam locomotives.

The traffic at present consists in the handling of about 33 trains eastbound daily. Of these there are probably seven through passenger trains for the east and one or two locals, the remainder being eastbound freight trains. On special occasions a considerably greater number of eastbound trains are handled within a 24-hour period.

A.S.T.M. Holds Annual Meeting

Preservation of Timber, Corrosion of Iron and Steel, Varnishes and Insulating Materials and Concrete Were Among Topics of Interest to Electric Railway Men

THE American Society for Testing Materials held its twenty-seventh annual meeting at the Chalfonte-Haddon Hall, Atlantic City, N. J., June 24-27. The total registration this year was 758, which was slightly less than last year. The following officers were elected: President, F. M. Farmer, chief engineer Electrical Testing Laboratories, New York, N. Y. Vice-President, J. H. Gibboney, chemist Norfolk & Western Railroad, Roanoke, Va. Members of Executive Committee, William Campbell, A. E. Jury, Anson Marston and J. A. Mathews.

REPORT ON TIMBER

The committee on timber had continued its investigations during the past year, which were conducted under the auspices of the Central Committee on Lumber Standards. In reviewing the recommendations made at the Washington conference, these were indorsed as marking material progress in standardization. The committee proposes to use some of the basic principles agreed on in connection with future developments in proposing standard specifications for timbers.

The report of the sub-committee on timber preservatives included a proposed tentative method of chemical analysis of zinc chloride and a revision of the standard methods of sampling and analysis of creosote oil. This latter revision involves the float test of residue, a revision of the specifications for distillation thermometers in accordance with the recommendations of committee on thermometers and another regarding distillation vessels for creosote oil and other high boiling materials.

The sub-committee on methods of testing wood has been considering revision of the tentative method of testing small clear specimens of timber and the preparation of a new procedure for conducting static tests of timber in structural sizes.

CORROSION OF IRON AND STEEL

The sub-committee on inspection of the Fort Sheridan, Pittsburgh, and Annapolis tests reported additional failures at Fort Sheridan among the non-copper bearing groups of sheets, with no failures in any of the copper-bearing groups. The first failures at Annapolis were recorded at the October, 1923, inspection, the sheets failing being in the same non-copper bearing groups as failed first at Pittsburgh and at Fort Sheridan.

The sub-committee on total submersion tests reported the failure of all of the light gage sheets at the Washington location and about 60 per cent of the light-gage sheets at Annapolis. A comparison of the failures in the light-gage sheets in the Calumet mine test completed in 1921, and the corresponding groups of sheets in the Washington test show the average life of the sheets immersed in water from the city of Washington supply to be about eighteen and a half times longer than the corresponding sheets immersed in mine water. The tests thus far do not indicate any outstanding superiority for any one type of metal, and the presence of copper added to the various types of metal does not increase its resistance to corrosion, when the samples are totally and continually submerged in running water of acid or alkaline reaction.

The sub-committee on tests of metallic coatings reported plans for conducting comprehensive exposure tests on metallic products, coated by eight recognized commercial processes. The tests are to be located at four different points representing as many various conditions.

PRESERVATIVE COATINGS FOR STRUCTURAL MATERIALS

The committee on preservative coatings for structural materials reported that a new sub-committee on shellac has been formed. The sub-committee on linseed oil has carried out a considerable amount of experimental work during the past year, but has not as yet proposed any standard recommendation. Tentative methods of routine analysis of titanium pigments and a tentative method of tests for coarse particles in paint pigments were recommended. The sub-committee on methods of testing varnish also recommended that the tentative method of testing oleo-resinous varnishes be advanced to a standard. Specifications for lithopone, lamp black, bone black, chrome yellow and chrome green were proposed for consideration.

ELECTRICAL INSULATING MATERIALS

In addition to a further study of existing standards and tentative standards, the committee on electrical insulating materials has formulated additional methods and investigations for various phases of the general subject of insulation. A proposed method of testing sheet and tape insulating materials for dielectric strength was included in the report and also a method for testing untreated insulating paper.

PETROLEUM PRODUCTS AND LUBRICANTS

The committee on petroleum products and lubricants recommended certain revisions in methods of testing grease and the viscosity of petroleum products and lubricants. Revision in methods of testing gasoline, naphtha, kerosene and similar products consisted of changes in the specifications for the high distillation thermometers.

CONCRETE

A paper by Cloyd M. Chapman gave results of an investigation conducted by Dwight P. Robinson & Company into the causes of cracking of the wearing surface of concrete floors. The cracking appears to be due to unusual contraction of the top coat. Shrinkage tests on mortar and concrete specimens showed that the aggregate used in 1:2 mortar and 1:2:4 concrete may exert a decided influence upon the amount of shrinkage which takes place when the mortar or concrete hardens and dries out. A paper by Duff A. Abrams on the use of calcium chloride in concrete for attaining rapid set and early strength gave the results of some investigations. The conclusion reached was that in the use of calcium chloride no advantage is gained for percentages of the commercial product greater than 2 or 3 per cent, corresponding to a chlorine content of 1 to 1½ per cent. This amount when used in mixes of about 1:5 and in consistencies suitable for building construction showed an increase in strength of from 100 to 200 lb. per square inch. For richer mixtures and drier consistencies the strength increase was greater and for leaner mixtures and wetter concrete it was less.

MANGANESE STEEL

A paper by John H. Hall and G. R. Hanks gave the average composition of manganese steel with brief comments on the proper limits for the different metalloids, together with a brief summary of steel-making methods employed in foundries making manganese steel. A summary was included on the physical properties, such as tension and bending tests, shear, hardness, resistance to wear, heat and electrical conductivity.

Fire Hose Coupling Threads Standardized

THE American Engineering Standards Committee announces approval of American national screw threads for fire hose couplings. This standard was submitted under the leadership of the National Board of Fire Underwriters, the National Fire Protection Association, the American Society of Mechanical Engineers and the American Water Works Association. It marks for the first time a national agreement on tolerances or limits of accuracy necessary to secure interchangeability in manufacture.

Wisconsin Association Midsummer Meeting

THE date for the midsummer meeting of the railway section of the Wisconsin Utilities Association has been set for Aug. 14 and 15 at the new Lorraine Hotel, Madison.

Mid-West Claim Agents' Association

THE fourth annual convention of the Mid-West Claim Agents' Association will be held at the Hotel Fort Des Moines, Des Moines, Iowa, July 18 and 19. The program follows:

FRIDAY, 10 A. M.

Address of welcome by Honorable Carl M. Garver, Mayor Des Moines, Iowa.

President's address, by Trevor C. Neilson, claim agent, East St. Louis & Suburban Railway.

Report of secretary-treasurer, by O. L. Borgquist, chief clerk claim and legal departments, Kansas City Railways.

"The Rule of Res Gestæ," by Hon. Herman F. Zeuch, judge municipal courts, Des Moines, Iowa.

"Enlisting Co-operation in the Claim Department," by F. G. Kelly, superintendent railway and claim department, Fort Smith Light & Traction Company.

FRIDAY, 2 P. M.

"Damage Claims," by F. W. Stockmar, St. Louis, manager Railway Audit & Inspection Company.

"Suggestions for Relief of Some of the Claim Agents' Problems," by W. E. Robinson, claim agent Cincinnati Traction Company.

"A Co-operation Plan for the Reduction of Accident Cost," by C. B. Proctor, claim agent Memphis Street Railway.

SATURDAY, 9 A. M.

Paper by F. R. Harrington, claim agent St. Joseph (Mo.) Railway, Light, Heat & Power Company.

"Preparation of Releases," by E. A. Funke, claim agent Lincoln Traction Company.

"Men," by R. S. Mahan, claim agent Kansas City, Clay County & St. Joseph Railway.

Election of officers.

Recent Improvements in Special Trackwork[*]

By P. Lo Balbo

General Manager Piedmont Steam Tramway Company, Italy

THE topic of special trackwork naturally divides itself into two parts, namely (1) the manufacture of parts and (2) their design.

One of the problems connected with electric railway frogs is means for reducing the blow which occurs when the wheel passes off the point of the frog and before the tread of the wheel reaches a support on the side bearing or wing of the frog. Obviously, with wide tread wheels there would be no trouble of this kind except at right angles or at angles approaching 90 deg. With the narrow tread wheels used on electric cars, however, a flange bearing in the groove is necessary. The Lille-Roubaix-Tourcoing Railway reports the use of some manganese steel frogs in which this flange bearing has kept its form since 1913. In others of similar type owned by the company this flange bearing has worn down, and an attempt has been made to build it up with the electric arc, but this method leaves a rough surface. The only way of smoothing a flange bearing renewed in this way, and thus reduce the noise, is to grind the welded portion with a wheel of the proper shape.

In its built-up Trail special work, the company used in early designs a hardened steel flange bearing held in place by screws, but in later designs these bearings have been put in as inset work.

Replies to the data sheet show that all types of special work are used. In general, preference is given to manganese steel, except for the cost, which seems to be higher than that in America. This has restricted its use considerably, and outside of England and France built-up special work is common.

One of the considerable factors in the cost of this special work is the large variety of patterns used. This suggests that economy can be secured through greater standardization.

This is primarily a question of standardization. The French Railway Association has attempted to establish certain standards and at the meeting on Dec. 20, 1923, the committee on tramways recommended four standard switches, namely, of 20 m., 30 m., 50 m. and 60 m. radii, and three frogs, namely with angles of 10½ deg. 11 deg. and 13 deg. Other standards set have been by the American Railway Association and the American Railway

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[*] Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

Engineering Association. Standards along this line are greatly to be desired and should not retard progress in the art if they are frequently revised to embody the results of experience and to care for newly developed needs.

Central Association Program

THE program for the Midsummer Meeting of the Central Electric Railway Association, to be held July 17 and 18 at the Breakers, Cedar Point, Ohio, will consist of morning sessions both days, devoted to general subjects, while the afternoon session on July 17 will be under the direction of the Engineering Council. The association dinner will be given the same evening.

There will be a meeting of the executive committee Thursday morning, after which the regular session will begin at 9:30 o'clock, Eastern standard time. Following is the program:

MORNING SESSION, JULY 17, 9:30 A.M.

President's address.
Report of the secretary and treasurer.
Appointment of convention committees.
Committee reports.

"Constructive Publicity and What May Be Accomplished By It," by W. H. Boyce, commercial manager Pittsburgh Railways.

"What Are We Doing to Increase Our Passenger Business," by F. W. Shappert, traffic manager Chicago, North Shore & Milwaukee Electric Railroad.

"What Are We Doing to Increase Our Freight Business," by L. M. Brown, superintendent Interstate Public Service Company.

"What Are We Doing to Increase Our Light and Power Business," by J. C. Matthieu, commercial engineer Dayton Power & Light Company.

"Forestry Conservation," by David L. Goodwill, former chairman forestry policy committee United States Chamber of Commerce.

AFTERNOON SESSION, ENGINEERING COUNCIL, 2 P.M.

"The Purpose, the Opportunities and the Future Possibilities of the Engineering Council," by K. A. Simmon, manager light traction division, Westinghouse Electric & Manufacturing Company.

"A Discussion of Some of the Latest Developments in High-Tension Insulation," by Arthur O. Austin, chief engineer and factory manager Ohio Insulator Company.

"Rolled Steel Wheels," a motion picture. Discussion by Lawford Fry, metallurgical engineer Standard Steel Works Company.

Reports of committees.
General business.

MORNING SESSION, JULY 18, 10 A.M.

"What Does the Interurban Electric Railway Mean to the Economic Development of the Central West," by Joseph A. McGowan, secretary-treasurer Terre Haute, Indianapolis & Eastern Traction Company.

"The Financial Structure of the Electric Transportation Industry," by J. P. Harris, vice-president Union Trust Company, Cleveland, Ohio.

New England Outing

THE annual outing of the New England Street Railway Club will be held this year at Norumbega Park, Auburndale, Mass., on Thursday, July 24. A full program to interest all members of the family has been arranged. Things begin to happen at 10 a.m. and continue all day, ending with a show at the theater in the evening. The afternoon program will include the annual costume baseball game between the street railway men and supply men.

Standardizing Copper Wire

SPECIFICATIONS for copper wire, including hard drawn, medium hard drawn and tinned, soft or annealed wire, have been submitted to the American Engineering Standards Committee by the American Society for Testing Materials. The specifications include requirements for purity of material, diameter, gaging, finish, tensile strength and elongation, specific gravity, electric conductivity, chemical test methods, packing and inspection.

These specifications will be considered by a special committee of representatives of the principal engineering and commercial societies interested in copper wire. The representative of the American Electric Railway Association is G. C. Hecker.

American Association News

Itinerary of Committee on Foreign Operation

THE special committee of the American Association on foreign operation, consisting of Executive Secretary James W. Welsh, President Harley A. Johnson of the Engineering Association and Harry L. Brown, Editor ELECTRIC RAILWAY JOURNAL, sailed from New York, Wednesday, July 9, on the *Aquitania*. The members of the committee expect to arrive in Southampton, England, July 14 or 15. They will make their headquarters at London for approximately two weeks, visiting points of interest in that city and taking short trips out from London to reach the nearby cities. During the first week in August they expect to visit some of the northern cities in Great Britain and Scotland, such as Newcastle, Liverpool, Manchester, Edinburgh and Glasgow. Following this, they will cross the channel to France, and will proceed immediately to Paris. On their arrival at Paris they will visit the various electric railway properties in that city and some of the major steam railroad electrifications in Switzerland, the electrification of the Midi Railway in southern France and the electrification of the Paris-Orleans Railroad. They expect to sail from Cherbourg on the steamship *Berengaria* Aug. 23, which is due to reach New York on Aug. 29.

Entertainment

THE entertainment committee of the American Association held a meeting at association headquarters on July 8 to discuss plans for entertainment at the October convention. Members present were: F. H. Gale, chairman; M. A. Oberlander, George A. Barnes, S. J. Cotsworth, John Craig, George Rowland, L. W. Shugg, George R. Lyman, A. A. Hale, F. L. Butler, Harry L. Brown and J. W. Welsh.

William Graham of J. J. Habermehl Sons, decorators, presented sketches showing a proposed treatment for the balcony spaces and other decorations in the ballroom, so as to harmonize the decorative scheme with the general entertainment features to be provided.

The arrangement of the entertainment features to be provided during the convention was discussed and the following tentative program was laid out: (1) An opening dance or reception to be held in the ballroom Monday night; (2) a general session with special musical features to be followed by dancing, Tuesday night; (3) a carnival with special features and dancing, to be held in the ballroom on Wednesday night; (4) a grand ball to be held in the ballroom on Thursday night.

Mr. Gale was appointed chairman of a sub-committee in charge of the opening dance or reception, and it was agreed that the entire committee would assist him in preparing for this function. Mr. Haie was appointed chairman of a sub-committee to arrange for the carnival and for special features for the grand ball. Mr. Craig was appointed to assist Mr. Hale in this work. Mr. Cotsworth was appointed chairman of a sub-committee in charge of music and Mr. Barnes of a sub-committee to arrange for golf.

The sub-committee to make arrangements for the grand ball will be headed by Mr. Palmer, while John A. Dewhurst will head a sub-committee to provide for entertainment features for the ladies.

Special Reports Available

THE Bureau of Information and Service of the American Electric Railway Association has prepared the following reports, which are available to member companies in good standing upon request:

Traffic Ratios, Part II: Interurban Lines.—About 125 interurban companies are included and there is shown for each company the average speed, revenue passengers per car mile, per mile of track and per car operated, operating ratio, revenue per mile of track, passengers per car mile, operating income per mile of track and other ratios similar to those given for the city lines in compilation issued June 1.

Attitude of State Regulatory Commissions Toward Motor Bus Competition with Railways.—This is a revision of the compilation of the same name issued Sept. 1, 1923, in which a number of changes have been made in the light of recent decisions in the development of the regulation of motor vehicles. It comprises a study of the development of the policies of the various state commissions in regard to the issuance of certificates of public convenience and necessity to motor bus operators.

Trend or Material Prices.—New edition of the association's compilation bringing down to date the trend of prices of materials used by electric railways as furnished by manufacturers.

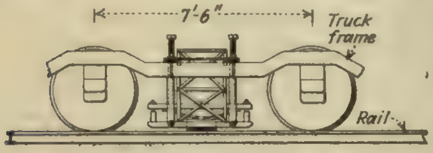
Motor Bus Operating Reports.—Gives figures on results of operation by different companies including the Washington Rapid Transit Company in Washington, D. C., the Sheffield Corporation Tramways, England, and others.

In addition to the above supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies have been prepared, bringing them down to date.

Maintenance of Equipment

Scrubber Keeps Rails Smooth

AN UNUSUAL method of removing rail corrugation and of smoothing down new rail joints has been developed by J. H. Haylow, chief engineer of the Memphis Street Railway, Memphis, Tenn. Carborundum bricks mounted on springs attached to the truck frames of a railway car press against the rails. Corrugations are removed by operating the car back and forth over the rough spots.



Machine Used at Memphis for Smoothing Corrugated Rail

This apparatus, the general appearance of which is shown in an accompanying illustration, is mounted on a single-truck work car equipped with a Brill 21-E truck and two GE-57 motors. Two flat steel bars 1 in. x 5½ in. extend across the top of the truck frame. Pressure adjusting screws of 1½-in. diameter pass through threaded holes in these bars. The adjusting screw at its lower end bears against a flat steel bar which, by means of a standard 21-E truck spring in turn bears upon the carborundum brick.

The carborundum bricks are 2½ in. x 3 in. x 12 in. and are held in U-shape frames. Pipe spacers allowing 1-in. play separate the frame which holds the brick from the bar against which the spring presses. Bolts with lock nuts are used to adjust the brick over the rail. A stiffening framework made of flat steel strips is used to give the apparatus rigidity.

The carborundum bricks bearing against the rail grind it down to a smooth surface. This work puts the motors of the car under a considerable strain, but inasmuch as the car is not used for other purposes it is felt that there is no objection to the practice. The machine is used at night when no other cars are passing over the track to be ground down, and has proved to be efficient and rapid in the performance of this kind of work.

Detroit Develops Truck for Arc Welding

TRACK welding and bonding on the municipal railway in Detroit is under the jurisdiction of the electrical department, and this department has recently put into service a welding outfit consisting of a welding unit mounted on a gasoline truck.

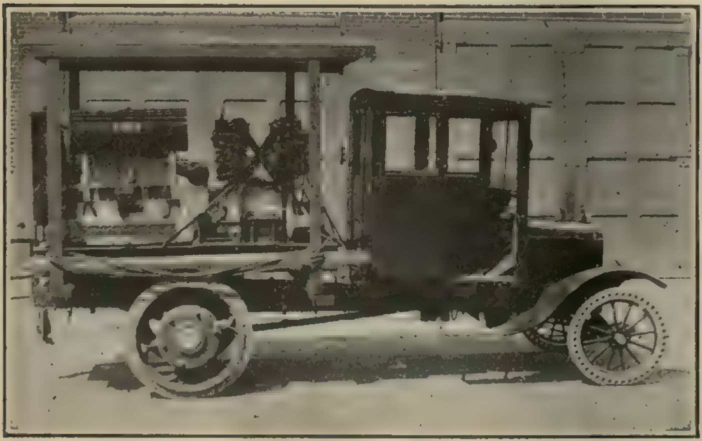
The truck includes a Ford 1-ton chassis, equipped with a Field closed cab and an Olson 2-ton unit, with an Olson No. 8 frame extension, steel wheels, special bearings and 16-leaf rear springs. The front tires are 30x3½ in. wide base Lambert, and in the rear, 34x6 in. Goodyear all-weather tread cushion tires are used. The accessories include a Stewart speedometer, Handy governor, electric lights and electric starter. The welding unit is a Wilson Welder & Metals Company's two-arc gasoline-driven engine.

This truck carries a crew consisting of two welding operators and a driver-helper. The latter, when the truck is not in motion, prepares and cleans the track joints for the operators, tends the welding equipment, serves the operators with welding wire and does any other miscellaneous work required with an outfit of this character.

It is anticipated that an extra light-weight reciprocating grinder (if such an article can be procured) will be added to the truck in order that the welding and essential grinding may be done by the same crew, thereby eliminating the expense and inefficiency incident to the welding being done by one crew and the grinding by another.

The electrical department is also developing a bond-testing car, such as is in use on other properties, for determining the electrical condition of rail joints. At present, joints are tested by means of a portable meter, it requiring approximately one year to test all the joints on the system. It is estimated that a bond-testing car can do the same amount of work in approximately one month. With the bond-testing car, a graphical record of the conductivity of each joint is automatically procured, and the location of defective joints spotted on the pavement by means of a paint gun attached to the car.

As a further check on welded track



Detroit Welding Truck with Canopy Up

Detroit Welding Truck with Canopy Down

joints both before and after the same are placed in service, the electrical department is investigating the field application of magnetic analysis, making use of either the defectoscope or the magnetoscope. Both of these instruments are described in the May, 1924, issue of the *Scientific American.* Welds which may pass a visual inspection may be defective. It is believed that any instrument which will determine, without testing to destruction, the condition of a weld will certainly pay for itself many times over. If either or both of these instruments can be used for the purpose cited, it is contemplated to place them on the bond-testing car.

The checking of rail grinding at track joints is another matter being given consideration, with particular reference to the use of an automatic indicator which will take the place of the usual straight edge. The latter instrument has its limitations, particularly in paved streets, because to determine the exact conditions it is almost necessary for the person using it to stand on his head. The automatic indicator will make unnecessary any such gymnastic convolutions and will, at the same time, give a true reflection of the conditions.

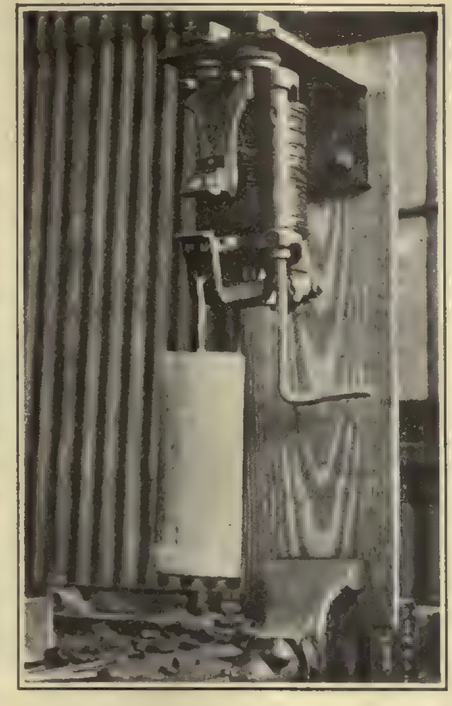
Practical Method for Testing Magnet Coils

MAGNET coils used in railway control apparatus are given a physical test in the Decatur shops of the Illinois Traction System to determine their fitness for service. This amounts to testing the coil under service conditions to determine if its pull is sufficient to operate the control mechanism. Such a test is used in preference to the electrical test because it is more simple and can be made more rapidly.

The coil is mounted in the usual bracket with the hinged armature attached. The bracket is bolted to an iron member which is mounted on a board held vertically in a bench vise during the test.

With the coil in position a 24-lb. weight is hung on the contact tip end of the armature. A specified current is sent through the coil and if the weight is raised so that the lower contact is brought up against the stationary contact the coil is considered all right for service. Otherwise it is marked B.O. and is rewound.

To facilitate the placing of a coil in the bracket the usual retaining nuts on the connecting bolts have been replaced by nuts having an extension with a handle at the end. These, as well as other details of the arrangement, are shown in the accompanying illustration. Since the use of this device was inaugurated the company has experienced no failures attributable to faulty testing of magnet coils.



Testing Magnet Coils in the Decatur Shops of the Illinois Traction System. The Magnet Is Expected to Raise a 24-Lb. Weight

Framing Parts in Stock Speeds Repairs

IN THE shops of the Omaha & Council Bluffs Street Railway a complete stock of framing parts is carried to speed up the work of repairing damaged cars. These parts include front vestibule framing, posts, sash, doors and other pieces most frequently damaged in service.

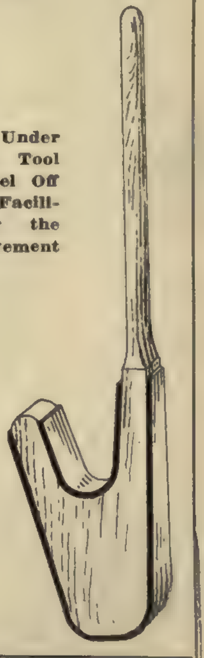
The practice for a number of years has been to keep the number of different designs of cars to a minimum, so as to reduce the number of different types of these repair parts that have to be carried.

All parts are finished and primed before being put into stock. In this way the amount of time necessary to make a repair on a damaged car is kept to a minimum. Convenient storage racks are arranged so that the stocks of repair parts are stored in an orderly manner, making them easily accessible when required.

The reduction in the time that a car must be held in the shop for making repairs, results in a material saving by keeping cars in service instead of in the repair shop. In addition, the cost of manufacturing repair parts is reduced because they are made in comparatively large lots, instead of being made up as special jobs in the wood mill each time a car comes in for repair.

Handy Tool for Moving Wheels and Axles

IN MOVING wheels and axles from place to place in the railway repair shop of the Georgia Railway & Power Company, Atlanta, Ga., it is often necessary to turn a sharp corner in changing the direction of movement. A simple handle has been devised to facilitate the turning movement. This consists of a J-shaped piece of wood about 5 ft. in length, with the hook about 24 in. long. Around the bottom a piece of $\frac{3}{16}$-in. iron has been bolted on to provide a substantial wearing surface, and a similar piece has been placed on the inside. The thickness through the base is slightly greater than the diameter of the wheels which are being moved.



When Inserted Under an Axle This Tool Raises the Wheel Off the Ground and Facilitates Changing the Direction of Movement

In using this tool the procedure is to insert it on a slant under the axle and then to straighten up the handle to a vertical position. This raises the one end of the axle so that the wheel is clear of the floor and holds it stationary. Then by pushing on the other end of the axle the set of wheels may be turned through any desired angle.

Lift Facilitates Compressor Removal

ANOTHER use to which air is put in the shops of the Illinois Traction System at Decatur is that of aiding in the removal and replacement of car air compressors. Adjacent to the compressor repair room is a track which leads to the rear of the shop grounds, and it is from a position on this track directly opposite the door opening to the compressor room that the air compressors are removed from the cars.

A short section of the rail nearest the compressor repair room has been arranged so that it can be removed after the car is in position. A platform, which normally rests under the rail, and which carries a small truck made especially for this purpose is raised to receive the compressor. After the compressor has been removed, the platform is lowered so it is even with the lower end of the ramp which leads to the pump room. The truck with the compressor on it is pulled by hand up this ramp, being guided by rails of angle construction. The compressor is removed by means of a chain hoist. A replacement compressor is placed on the truck and the process is reversed.

The construction of the apparatus presents a neat appearance of permanent design, being of concrete and steel throughout. Two 10-in. by 12-in. brake cylinders have been bolted together to form the two cylinders of the lift. These are set in the ground at such a depth that the platform will, when lowered into a shallow pit, be below the base of the track rail. The cylinders are spaced an equal distance on each side of the rail, approximately 24 in. center to center. Suitable underground air pipe connections have been made between the cylinders and the pump room where the control valves are located.

The short section of rail, which is approximately 3 ft. long, is supported at the ends by the concrete wall surrounding the pit and also by means of a short piece of timber, attached to the rail, which rests upon a concrete beam located directly under the rail. The wood timber or tie has been cut away on the underside to allow room for the platform when it is lowered. The base of the rail has been cut away at each end of the short section, the web fitting between fish plates fastened to the adjoining section of fixed rail. A single hole, through the fish plate and web of the rail, permits a bolt to be inserted to insure a secure fastening of the removable piece of track when elevating platform is not in use.

The platform, mounted on the ends of the piston rods of the cylinders, is made up of two steel members 6 in. wide by 1 in. thick and 24 in. long. One of these has been mounted on the end of each piston rod while the two have been connected at each end by means of a channel member which serves as a guide and track for the small truck.

The truck is of low frame, heavy construction, the side sills being bolted together at the ends to form the end sills. Small wide tread wheels, inside mounted on heavy axles, do not rise above the top of the side frame. This truck is 24 in. wide and 30 in. long. At one end a handle has been provided to which a rope is attached to facilitate pulling. Angles have been embedded in a concrete ramp which has a rise of approximately 5 in. and serves to guide the truck as it is being pulled into the compressor room.

With shop air pressure of approximately 100 lb. this device has a lifting power of 15,000 lb.

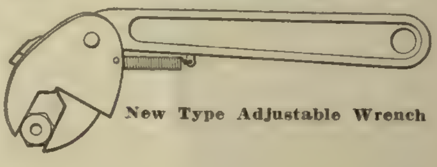
Left—Air Compressors Are Removed from Cars at Decatur Shops of Illinois Traction System by Means of an Air-Operated Lift Having a Capacity of Approximately 15,000 Lb. Right—Two 10-In. x 12-In. Cylinders Bolted Together Form the Lift. Small Truck Carries Compressor Into Pump Shop

New Equipment Available

Automatic Adjustable Wrench

ANEW type of wrench shown in the accompanying illustration is being marketed by the Speednut Wrench Corporation, Chicago, Ill. The wrench proper consist of three forged steel parts, which include the two jaws and the handle. A spring is furnished to aid in keeping the jaws in constant adjustment. The wrench, however, works without the spring, which is designed so that it can be easily detached or attached as required.

The wrenches are made in two sizes; the 8-in. size takes nuts from $\frac{5}{16}$ in. to $\frac{3}{4}$ in. and the 6-in. size nuts ranging from $\frac{1}{8}$ to $\frac{7}{16}$ in. Both sizes are arranged with ratchet for opening and closing the jaws. This wrench construction provides for a tight fit regardless of the worn condition of a nut.



New Type Adjustable Wrench

New Machine Tool Controllers

ANEW line of magnetic machine tool controllers has been placed on the market by the General Electric Company, Schenectady, N. Y. They employ the counter-emf. method of acceleration and are applicable to both reversing and nonreversing, constant and adjustable speed drives. They have been developed primarily for application to direct-current motors in sizes ranging up to and including 15 hp.

The controller provides two accelerating points; the starting resistor is automatically short-circuited in one step upon proper acceleration of the motor. This is accomplished by an accelerating contactor whose closing is governed by the counter-emf. of the motor.

A complete redesign has been made of the same company's larger types of magnetic machine tool and general purpose controllers.

The News of the Industry

Applications for Bus Permits Renewed in Buffalo

Another definite step has been taken by the International Bus Corporation, a subsidiary of the International Railway, and the VanDyke Motor Car Company to establish bus service in Buffalo, N. Y. Their previous applications were rejected by the City Council. After the filing of the new requests Mayor Schwab set July 18 as the date for a public hearing for permits to operate in Delaware Avenue and Delavan Avenue.

The International Bus Corporation would establish a fleet of double and single-deck buses to operate on a 10-cent fare with a 3-cent charge for transfers to a connecting trolley line and a 6-cent charge for a transfer from a trolley to a bus line. The trolley fare is 7 cents or four tokens for 25 cents. Under the proposal of this company the city would be empowered to take over the lines on July 1, 1934, or on July 1 in any year thereafter on six months' notice at the value of the physical property.

The VanDyke company proposes to operate on five city routes covering widely separated parts of the city. It agrees to pay the city 3 per cent of its gross receipts and to operate thirty buses each with a carrying capacity of sixty passengers on a 10-cent fare with free transfers to connecting bus lines.

The consent of the Public Service Commission must be obtained in addition to that of the City Council if either line is to operate.

Of interest in this connection is the opinion of Corporation Counsel Frederick C. Rupp handed down at the request of the City Council in which he holds the city cannot operate municipal bus lines in the streets or on parkways that are approaches to parks. Notwithstanding the opinion, City Commissioner Frank C. Perkins, the Socialist member of the board, insists that the city buy and operate fifty buses at a cost of $300,000 or more to be used as the basis of a larger fleet of municipal buses to serve all sections of the city. The resolution of Commissioner Perkins was defeated, but it is expected that it will be considered at some future time by the City Council.

Restraining Order Issued Against Atlantic City Union

An order has been issued by Vice-Chancellor Ingersoll prohibiting striking motormen and conductors of the Atlantic City & Shore Railway, Atlantic City, N. J., "from interfering in any way" with the operation of cars. The order prevents the strikers from picketing street corners, endeavoring either verbally or by cards and signs to persuade persons not to board the trolleys, and interfering with those operating the cars. For some time now the company has been operating cars on normal schedule, but the strikers have picketed every corner, displaying cards and signs, calling attention to the strike and suggesting that the trolleys be boycotted. Mayor Bader has placed an official ban on a move by strikers to disrupt railway service by running free buses.

Mayor Dever Talks Transit

Chicago Executive Sees Need for Co-ordination of Elevated, Subway, Surface and Bus Lines

Immediate action on the many Council resolutions urging construction of subways in Chicago forthwith will be demanded in another resolution to be presented to the City Council at its meeting on July 15, according to a statement made by Alderman Thomas J. Fowler, upon his return from New York City.

The New York subway has been the particular interest of the many city officials, including Mayor Dever, who have been attending the Democratic convention. Within two days two different correspondents, one of the Chicago *Tribune* and another of the Chicago *Journal*, quoted the Mayor as having said that in his opinion street cars were "practically obsolete."

Then, two days later, the *Tribune* had wired an extensive interview with the Mayor. Mr. Dever dictated the statement, which he declared was the first time he had definitely talked about Chicago's transportation problem. Just now Chicago's Aldermen are trying to reconcile the second interview with the first. The *Tribune* quoted the Mayor as follows:

> No one who has given much thought to Chicago's transportation problem will argue that we may be able to dispense with the surface lines in the near future. The fact is the bus furnishes us with a new and desirable unit of service and is a factor which should not be lost sight of when we are dealing with the traction problem.
>
> Fundamentally a sound solution of the traction question must provide for rapid transit service through the Loop and radiating to all sections of the city. This necessarily includes the building of subways and the use of them in conjunction with the elevated lines, and, in some measure, by the surface lines. The proper development of a new rapid transit system will, in my judgment, include the building of subways and the use thereof by the elevated lines and the surface lines in such manner and to such a degree as good engineering may dictate. But it will also include the wide and increasing use of the bus.
>
> May I repeat that I do not believe that the bus is adapted to eliminate our surface lines, which are now carrying approximately 80 per cent of the total passenger traffic of our city? The surface lines are a very important factor in our local transportation service and they will continue to be so for years.
>
> When the four units of service—elevated lines, subways, surface lines and buses—are properly correlated and unified Chicago will then have a system adequate to its needs.
>
> In proposals made by the city to purchase the Surface Lines we are trying to keep all these facts in mind. Our purpose is to acquire these properties at a fair price. That is to say, at such a price as will enable us, when the city takes them over, to operate them with a reasonable hope that good service may be given to the people and the lines unified and extended, thereby taking the traction question out of our local politics.
>
> Let us not befool ourselves. Roughly, the Surface Lines in Chicago today carry 800,000,000 passengers a year. The motor buses and the elevated carry 200,000,000 a year. Hence the folly of saying—which I have never said—that the Surface Lines can soon be eliminated from congested areas. But it is also true that only in their wide transformation and their thorough unification do they contain a useful and convenient future for us. Also we must always keep in mind the high desirability of the bus as a unit of service.

Planning Interurban Extension

Schedules for two through limited interurban passenger trains a day each way between Indianapolis and South Bend, Ind., are being worked out by the Winona Service Company in conjunction with the Union Traction Company and the Chicago, South Bend & Northern Indiana Railway. These trains would stop only at county seats. At the same time plans are under way for a further development of the interurban freight business. It is not proposed to run passenger cars through from Louisville to South Bend. There would be close connections and a change at Indianapolis. The proposed limited trains from Indianapolis to South Bend would run over the Union Traction lines to Peru, over the Winona Service lines from Peru to Goshen and over the Chicago, South Bend & Northern Indiana from Goshen to South Bend. This plan has been developed since Harry Reid, president of the Interstate, and James P. Goodrich, former Governor of Indiana, acquired the Winona line.

Hearing Ends on Plea for Fare Increase in Niagara Falls

Hearings have been closed by Public Service Commissioner Pooley on the application of the International Railway, Buffalo, N. Y., to abandon its Sugar Street line in Niagara Falls and to increase the fare there from 5 to 7 cents, with four tokens for 25 cents, the same rate as charged by the International Railway in Buffalo. The commissioner indicated he would recommend abandonment of the Sugar Street line, but would not favor a fare increase in Niagara Falls at this time. Testimony was introduced by the railway to show it sustained an annual loss of $34,000 by operating the Sugar Street line. The commissioner indicated that if a higher rate of fare was granted the International in Niagara Falls he would be inclined to deny the abandonment petition on the ground that other lines in the city could carry the losses sustained through the operation of the Sugar Street route.

Slight Advance in Eastern Massachusetts Pay

An agreement which carries a slight advance in wages for 1924 has been entered into between the Eastern Massachusetts Street Railway and the carmen's union. The advance is so slight, however, as to be almost negligible. The basic rates of 58 cents an hour for the men on two-man cars and 63 cents an hour for the operators of one-man cars will remain undisturbed, but the change will come in the computation of compensation for excess time. The excess time payment will be figured on the basis of the pay the men receive instead of on the basic rate for two-man car operators, as formerly.

Nine hours will constitute a day's work, to be completed within a spread of eleven hours, as at present, and when the men have to work into the twelfth hour in order to finish a nine-hour day they will receive extra compensation of 20 per cent of the straight pay for the extra hour. Inasmuch as the one-man car operators receive 63 cents an hour their extra pay will be figured on the 63 cents basis instead of the 58 cents basis which was used under the old agreement. Operators of two-man cars remain on the same pay basis as before, but only a small percentage of the company's cars today are two-man cars.

Negotiations for a new agreement have been in progress since last May. They were delayed somewhat by the fact that a bill was before the Massachusetts Legislature to establish a shorter day for the carmen. The Legislature did not pass the proposed legislation and negotiations were resumed.

Wage Agreement at Three-Cent Advance at Montreal

The employees of the Montreal Tramways, Montreal, Que., unanimously accepted the offer of the company on June 17 for a wage agreement which will be effective for a period of three years. The decision affects 3,500 men. The proposal submitted by the company to the men provides for a general increase of 3 cents an hour to the present rate and an additional 5 cents an hour for Sunday work and holidays. These proposals were contingent upon the signing of an agreement for a period of three years from July 1, 1924. It was expected on July 4 that an agreement on this basis would be signed in a few days.

The present rates for trainmen are: First year, 39½ cents an hour; second year, 44 cents an hour; after two years, maximum rate of 48 cents an hour. Certain classes engaged in freight and other special services are paid at the rate of 5 cents an hour additional. The proposed increase applies to all employees, conductors, motormen, carhouse men and shopmen. It was agreed that regulations regarding working conditions should be discussed and arranged following the ratification of the three-year agreement.

For several years the men at Montreal have been interested in having a pension fund established. After several months work the management submitted a plan providing for life insurance up to $2,000, sickness and injury benefits of half-time for a period of twenty-six weeks and old age pension of $50 a month at the age of sixty-five years, after twenty years of service. A vote was taken on this by the members of the union and as the majority of those in attendance were men of comparatively short terms of service with the company the proposal was voted down.

Six-Day Week Voted by Boston Men

Preparatory to the formal arbitration of wages and working conditions the carmen in the employ of the Boston Elevated Railway have voted to introduce a six-day week on the system. The union voted on this issue after a series of conferences between the officers of the union and trustees of the company. The vote was taken on this question:

> Do you favor changing to a six-day work week, with the knowledge that the question of wages is to be arbitrated?

The vote in the affirmative was 2,857 to 590.

Wage Agreement on Michigan Electric Railway Renewed

Agreements were signed on July 2 with the various employees' associations by which the Michigan Electric Railway, Jackson, Mich., is to pay the same wage to conductors, motormen and other car operators that was in effect on the properties previous to June 1, 1924. This is a two-year agreement. Under the new agreement the rates in cents per hour are to be as follows:

INTERURBAN CONDUCTORS AND MOTORMEN

First six months of continuous service	49½
Thereafter	54½

OPERATORS OF ONE-MAN CITY CARS

First year of continuous service	49½
Thereafter	52½

CONDUCTORS AND MOTORMEN OF TWO-MAN CITY CARS

First year of continuous service	44½
Thereafter	47½

Five cents additional an hour will be paid for all work in excess of regular scheduled runs.

With respect to the rates for interurban conductors and motormen on the Michigan Railroad and the Grand Rapids, Holland & Chicago Railway the same rates will be in effect for them as on the Michigan Electric Railway.

Recess Committees to Consider Railway Problems

Two legislative recess committees have been appointed under authority of the Massachusetts Legislature of 1923-24. One is charged with the duty of studying the various problems relating to the control, supervision and regulation of motor vehicles, which takes in jitneys. The other is to consider the methods of financing additions, extensions and improvements of the Boston Elevated and also the question of terminating the public control of the Elevated.

City Insists Upon Service Guarantee

The announced intention of the Janesville Traction Company, Janesville, Wis., to replace service on Washington Street with bus operation as a measure of economy, reached a climax on July 1 when the company sought to make the announcement a reality. This it was prevented from doing by the paving company now engaged in improving the street. The railway is confronted with the problem of taking out its rails, continuing the line by agreeing to stand the cost of paving or establishing bus service. Meanwhile the city demands a written guarantee regarding the character of the new service. A conference between city and railway officials, held to try to reach an agreement, resulted in a deadlock. The matter was then carried to the Railroad Commission.

Members of Crew Involved in Indiana Wreck Are Indicted

Frank J. Nolen, motorman on the Indiana Service Corporation's special car, one of the cars in the wreck at Roanoke, Ind., on May 19, in which six persons were killed, has been arrested on indictments charging involuntary manslaughter, returned at Huntington, Ind. A similar indictment against Leonard Gushwa, conductor on the special, will be served, it was said. The indictment charges that the crew on the special was guilty of negligence because of failure to obey a standing order to keep the track clear for the Wabash Valley Flyer, the other car which figured in the wreck.

New Franchise Sought in Sioux City

The Sioux City Service Company, Sioux City, Ia., has requested the City Council to call a special election for the purpose of submitting a twenty-five year franchise to the voters covering the company's railway lines. The attitude of the company as expressed through W. J. Bertke, vice-president and general manager, is that there is a real demand for railway extensions, and the railway, as a vital public utility, should be encouraged to place itself upon a financial basis sufficiently strong to meet the demand.

In connection with the matter of financing Mr. Bertke has explained that when the Sioux City Gas & Electric Company took over the Sioux City Service Company in November, 1922, it was necessary to sell an additional $1,000,000 of bonds of the Sioux City Gas & Electric Company to pay off the floating debt of the Service company and to provide funds for its immediate requirements. At that time the bankers interested were unwilling to purchase securities of the Service company in the face of poor earnings from railway operation and the fact that franchises were about to expire.

Mr. Bertke believes that a new franchise for the use of the streets for railway purposes should be granted to the Sioux City Service Company for twenty-five years, the statutory limit.

Suggestions Invited in Baltimore

The United Railways & Electric Company, Baltimore, Md., has asked the public to co-operate with it in improving the service. The invitation to make suggestions has been extended by means of large notices displayed in the cars. "Give Us that Idea," the notice is headed, large red type being used. The notice says:

> If you have a suggestion which you think would improve the service of the Street Railway System will you please write it down, sign your name and mail it to H. B. Potter, service department, United Railways & Electric Company, 1005 Continental Building.

Supervisors Direct Strangers at Convention

During the recent national convention of the Kiwanis Clubs in Denver, the Denver Tramway furnished some of its oldest and best informed supervisors to the committee in charge of the entertainment of visiting delegates. The supervisors were dressed in the regulation Tramway uniform, and were equipped with badges informing strangers that they would be glad to furnish any desired information regarding Denver. They were stationed in information booths in the Union Passenger Station, at General Registration Headquarters, in the lobbies of some of the principal hotels and at other strategic locations.

In addition all trainmen in service on the cars of the company were equipped with badges bearing the words "Ask Me" in large letters. This helped to indicate to the visitors and residents of the city as well that the company was more than willing to share in making the convention a success.

Interborough Extends Wage Agreement

The Interborough Rapid Transit Company, New York, N. Y., after numerous conferences with representatives of the Brotherhood of Interborough Employees, has agreed to continue the existing wage contract for another year, commencing July 1. Frank Hedley, president and general manager, has arranged to continue the conferences so as to consider minor adjustments. Matters are proceeding amicably.

Chicago Rerouting Plan Appears to Be Endangered

The city of Chicago's elaborate rerouting plan, worked out with the cooperation of Maj. R. F. Kelker of the City Council's transportation committee and the Chicago Surface Lines, appears to be endangered at an important point through the necessity of obtaining frontage consent for the construction of 400 ft. of single line track.

An appeal to the board of directors of the Chicago & Western Indiana Railroad, owners of the property past which the track is to be constructed is to be made by the city.

The proposed 400 ft. of track is essential to the rerouting of the Archer, Ashland and Racine lines and incidentally, of course, the whole plan is involved. In the rerouting plan, the cars coming north are to turn from State Street via Polk Street to Dearborn Street. The link from Dearborn to State has not been constructed.

Legally, the company or the city has no redress in the event of a definite refusal. The railroad owns all the frontage on one side of the street and sufficient on the other side to give it a clear majority.

Detroit Wage Matter Still Before Courts

Important developments have transpired in the wage dispute between the street car men's union and the Detroit Department of Street Railway. Among them is included the granting by the Michigan Supreme Court of a motion of Clarence E. Wilcox on behalf of the Street Railway Commission for a review of Judge Richter's decision which would compel the Detroit Street Railway to arbitrate the wage demands with the employees. On the other hand, union officials have tried to stop the city's appeal to the higher court, through conferences with acting Mayor Joseph A. Martin. Although no details were given out as to what transpired at either of the conferences with the acting Mayor, the union officials are said to have sought to withdraw.

The street railway commissioners have have been determined in their stand that they would not arbitrate with the union under any consideration and that there would be no arbitration with the union even though a new agreement for a basis of arbitration be sought, at least not until such action is ordered by the higher court. It was reiterated that the men have their own association within their ranks which is considered as conclusive proof that the men can secure justice and fair play.

Mr. Wilcox in contesting the mandamus writ ordered by the Circuit Judge argued that the union and not the employees of the department brought the mandamus proceedings; that neither of the two petitioners for the mandamus is a Detroit Street Railway employe; that Michigan laws do not require arbitration; that the arbitration provision of the charter of the City of Detroit violates the provisions of the Federal Constitution because of its indefinite term of procedure.

Preceding the conferences between union officials and acting Mayor Martin it was announced that the Detroit United Railway platform men had renewed their pay pact with the company for one year with no change of schedule. The agreement is between the railway and Division 26 of the Amalgamated Association. The wage scale was announced as follows: 61 cents an hour for beginners; 64 cents an hour after three months and 66 cents an hour after one year with 5 cents an hour extra in all cases for operators of one-man cars. The one change in the agreement it was announced, provides specifically that the business agent shall be an employee of the railway.

The wage scale which the men are now asking from the city on the municipal lines would give the men 72, 76 and 80 cents an hour. Officials of the Municipal system see no reason why the city should pay a higher rate than prevails on interurban lines operating in the city, where for twenty years the same wage scale has prevailed both.

News Notes

New Bus Line Running in Baltimore.—A new bus line connecting the northeastern and southeastern sections of Baltimore has been put into operation by the United Railways & Electric Company. The line was ordered established by the Maryland Public Service Commission at the same time the company was granted an increase in fare from 7 to 7½ cents. The same fare as is charged on the cars is in effect and transfers are issued. The buses are of the 24-passenger type.

Nebraska Road Increases Fares.—The State Railway Commission of Nebraska has consented to a test of a new rate on the Omaha & Southern Interurban Railway between Omaha and Fort Crook that is an increase of 3¾ cents over the present 15-cent fare. The railway had started an injunction suit to restrain the commission while it charged more than the passenger fare of 2 cents a mile provided by state law. The steam railroads have been charging 3.6 cents for several years under a federal court order, but the interurban was still doing business on the 2-cent basis. The company operates in three zones. The road is only 7.8 miles long.

Buses for Private Hire.—Two twenty-seven passenger buses to be used for private hire work have been delivered to the Eastern Massachusetts Street Railway, Boston. They are of the street-car type mounted on White chassis.

Safety Contests at New Orleans.—The membership of the five carhouses embracing the railway system of the New Orleans Public Service Inc., engaged in a friendly contest during June to see which of the lines could operate during the month with the fewest number of mishaps and accidents. The membership of the Prytania carhouse made the best record. In consequence the conductors and motormen of the lines operated there are wearing on the lapels of their coats strips of silk ribbon bearing the inscription "Winner." The captains of the various lines operated from the Prytania carhouse were presented handsome floral gifts by the officers of the company and by Paul H. Maloney, Commissioner of Public Utilities. The winning carhouse also was awarded a pennant which it will display there during the time that the similar contest is underway for July.

More Bus Rights Sought by Public Service.—The Public Service Railway, Newark, N. J., has applied to the Board of Public Utility Commissioners for permission to replace the Crosstown and Fifth-Broadway lines, Camden, N. J., with a bus line. The corporation has also asked for a formal permit for the new Fairview line, operating in Camden. The commission has granted permission to the railway to abandon trolley service on the North Cramer Hill line, Camden, and to use buses exclusively in serving that territory. There was no objection on the part of the city to the abandonment.

Railway Objects to One-Way Street.—The Louisville Railway was one of the number of concerns represented at a hearing before the City Council on July 1, regarding an ordinance for making Fourth Street a one-way street for traffic. Samuel Riddle, vice-president of the railway, opposed the plan. He argued for better regulation of traffic. He said that of the 67,000,000 passengers hauled by the company in 1923, 10,000,000 were hauled on Fourth Street. One way traffic on Fourth Street would make it necessary to build two or three blocks of track, and put in costly turns, etc. The one-way plan is backed by Fifth Street realty interests anxious to increase travel to Fifth Street to the benefit of their realty holdings.

Discloses Bus Plan.—The Third Avenue Railway System's plan for bus service in Yonkers, N. Y., will be presented to the Common Council of that city on July 22. The plan is said to propose the substitution of buses for trolleys on three routes in the vicinity of Yonkers, the establishment of a "U" bus route in the city and a suburban line to Bryn Mawr station. A 10-cent fare would be charged with free transfers to and from trolleys. Getty Square is proposed as a terminus for all the bus routes that might be installed.

Buses Replace Trolley on Five-Mile Route.—Buses will soon displace the trolley line operated by the Montoursville Passenger Railway on a 5.5-mile route between Montoursville and Williamsport, Pa. One of three buses to be used on the route has been delivered. Service will begin with the arrival of the two others. Operation will be under the direction of the Lycoming Auto Transit Company, successor to the trolley company, which, by permission of the County Court, has surrendered its charter.

Bill for Six-Day Week Lost.—The bill introduced by John M. Wynn of Shreveport, Caddo Parish, La., providing for a six-day week for all conductors and motormen has failed to pass the Louisiana House, and on motion to reconsider was indefinitely postponed.

Arrest "Bus Queen."—Helen Schultz, "America's Bus Queen," proprietor of the Red Ball Transportation Company, Mason City, Iowa, was arrested recently on information filed by Frank Hanlon, manager of the Mason City & Clear Lake Railroad, on a charge of operating buses without a license. Miss Schultz was running five extra buses to carry a large crowd of holiday-makers from Mason City to Lake resorts. She and eight of her drivers, arrested with her, each provided a $200 bond and were released to appear for hearing on July 11. Miss Schultz contended that she was operating within the statute even though she had been denied permission to operate between Mason City and Clear Lake. Her contention was that she did have a permit for operation from Mason City to Algona.

Bus Line Suggested for Portland.—An offer to start and maintain a bus line from the central portion of Portland, Ore., to and from St. Johns was made by A. E. Jones, president of the St. Johns Community Club, at a recent conference with Franklin T. Griffith, president of the Portland Electric Power Company. In making the offer he stated that in his opinion an 8-cent fare would yield a profit on the amount invested. President Griffith has taken the matter under advisement, it is reported.

Foreigner Impressed with Chicago Operation.—Among the visitors to electric railway properties in this country, is G. A. Hobler, chief engineer of the New South Wales Government Tramways, Australia. Mr. Hobler recently inspected the property of the Chicago Rapid Transit Company. He is interested in manganese rail as it compared in service with open hearth rail. He was impressed with the number of trains operated around the Chicago loop and with the speed attained in handling them.

Bus Grant for San Diego Railway.—A ten-year franchise for the operation of buses on the streets of San Diego, Cal., has been granted the San Diego Electric Railway by the Common Council of that city. The franchise became effective on July 10. It provides for a tax of 2 per cent on the annual receipts from the operation of buses. Indemnity insurance of $5,000 covering the injury or death of one person by a bus, of $10,000 for more than one person and $1,000 for injury of the property of a third party is also provided. Fares, routes and schedules are subject to authorization of the Common Council and can be altered at any time by that body. A majority vote of the electors of the city may also rescind or modify the franchise.

Asks Bus Grant in Boise.—A twenty-year bus franchise has been asked of the Boise, Idaho, Common Council by the Boise Street Car Company for one route in that city starting at the Union Pacific station and extending to Eighth and Idaho Streets. Hourly service from 7 a.m. to 10 p.m. on a maximum fare of 10 cents is proposed.

Ten-Cent Zone Fare Authorized in Maine.—The Public Utilities Commission of Maine on July 2 rendered a decision permitting the Central Maine Power Company to establish a zone fare of 10 cents, with the provision that eleven tickets, each valid for a single fare or some ride, may be purchased for $1, half fare tickets for school children and other special rates being based on a 10-cent fare, on its railway between Warren and Camden, a distance of 21.47 miles. The present zone fare is 7 cents with school tickets on the basis of one-half the regular fare.

One-Man Cars on Jersey City-Newark Line.—One-man cars will be used on the Jersey City-Newark line, of the Public Service Railway operating over the turnpike. The new service will probably be started on July 20.

City Insists Buffalo Company Pave.—Unless the International Railway, Buffalo, acts at once to repair its tracks on more than six local lines and renew the paving between the tracks and one foot on each side, the City Council has threatened to declare the company's franchise on these streets null and void. The improvements would cost upwards of $300,000. The company contends it has not sufficient funds with which to make the necessary improvements and repairs.

Bus Permit Denied in Syracuse.—Passage of an ordinance designed to permit the operation of buses in Syracuse, N. Y., on the Scottholm route by the Syracuse Co-ordinated Bus Line, Inc., subsidiary of the New York State Railways, was defeated in the Common Council on June 30, by one vote. A similar ordinance applying to a route on James Street will be considered in the near future. The railway subsidiary proposes operation on a 7-cent fare with a free transfer privilege. The application of James W. Dillon, an independent operator, for a permit to operate buses over four routes in the city, among them the Scottholm and James Street routes, on a 5-cent fare, is also pending.

Traffic Control System in Rochester.—An automatic control system for the regulation of traffic is being installed on Main Street, Rochester. The traffic will be controlled by means of a system of colored lights, regulated from towers at strategic points. Virtually every trolley line in Rochester traverses or crosses Main Street and the new system is expected to lessen traffic congestion. The New York State Railways co-operated with the city in erecting the electric control towers.

Seven-Cent Fare in Niagara Falls, Ont.—The Canadian National Railways, a government owned system in Canada, increased the fare on the local lines in Niagara Falls, Ont., from 5 to 7 cents, on July 1. The fare on owl cars from 2:30 until 5:30 a.m. is now 15 cents. A special rate for school children has been put into effect giving them a 4-cent fare, with seven tickets for 25 cents. Mayor Newman has protested to officials of the railway against the alleged hasty action in putting the new fare into effect.

Interurban to Use One Man in Off-Peak Hours.—The Erie County Traction Company, which operates from the city line at Buffalo, N. Y., to Gardenville, Orchard Park and Ebenezer, has started one-man service between 9 a.m. and 3 p.m. The company operates five cars and employs twenty-six platform men. It has been losing money. The one-man service during off-peak hours is regarded as essential to cut down expenses. The company formerly was known as the Buffalo Southern Railway.

Fare Hearing Postponed.—The hearing on the petition of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., for permission to increase its fares, set for July 9, has been postponed to July 16 at Albany.

More One-Man Cars in Rochester.—The New York State Railways, Rochester Lines, began one-man car service on July 1 on the Goodman-Emerson line, the second route in the city over which one-man cars are now operated. A new schedule calling for more frequent service marked the installation of the new type of equipment. The cars used in the one-man service were rebuilt in the shops here.

Financial and Corporate

Bondholders Buy Road

Seventy-Mile System in New York City Sold—Reorganization Plan Approved by Transit Commission

A purchasers' committee from the New York Railways reorganization committee at noon on July 7 bid $4,086,035 in all for ten parcels of franchises and real estate offered by Nathaniel A. Elsberg as special master appointed in the New York Railways receivership proceedings. Joseph P. Cotton made the bids on each parcel for the committee and Mr. Elsberg announced that, subject to the approval of the United States District Court, they were accepted, there being no other bidders.

Among the franchises and other railroad properties sold were those of various subsidiaries of the New York Railways, including the South Ferry Railroad, the Lexington Avenue & Pavonia Ferry Railroad, the Central Crosstown Railroad, the Chambers & Grand Street Ferry Railroad, the Metropolitan Crosstown Railroad, the Metropolitan Street Railway and the Columbus & Ninth Avenue Railway.

The real estate disposed of consisted of many parcels, all in New York City.

The company operates 75 miles of surface lines in New York City, principally in lower Manhattan. The terms of the plan under which it is intended the reorganization shall be carried out provide for a reduction in total capital liabilities from $91,366,445 to $40,163,622. The details were reviewed in the ELECTRIC RAILWAY JOURNAL for May 17, page 793.

OUTLINE OF COMMISSION'S OPINION

On the recommendation of General John F. O'Ryan, the Transit Commission on July 8 approved the plan of reorganization of the New York Railways submitted to it by the reorganization committee. There will be public representation upon the directorate of the new company. This was recommended by the Transit Commission, although the commission did not possess the power to direct the inclusion of public directors in the board. The number of public directors of the new company is a detail yet to be arranged and will depend upon the manner of constituting the whole directorate.

General O'Ryan, in an opinion approved by the commission, discusses the importance of keeping the present system together as proposed in the reorganization plan, points out that the proposed capitalization of the new company does not exceed the fair value of the property and refers to the certainty that the company will be able to meet its fixed charges.

General O'Ryan says that the principal question is whether the proposed amount of capitalization exceeds the fair value of the property involved. He then reviews the fact that this new capitalization, including all new bonds, undisturbed underlying bonds, and 275,030 shares of no-par value stock, rated at $5 a share, aggregates $40,163,622, instead of the capitalization of $91,366,445 of the New York Railways and its present subsidiaries.

In connection with his discussion of this matter the commissioner says that a number of valuations were put in evidence or are available. These were valuations of the property of the New York Railways and of the properties of the subsidiary companies. It is explained that the question was raised as to the propriety of taking the value of the property owned by the subsidiary companies, which is not to be acquired by the new company, rather than the value of the stock in such companies, which represents the property intended to be acquired; but the commission deemed it unnecessary to express an opinion upon that at this time. It says that the actual original cost was not ascertainable for want of data, but estimates of the original cost were available. Estimates of the cost to reproduce at present-day prices and also at pre-war prices were introduced. In brief they follow:

PRESENTED BY PETITIONERS	
Cost to reproduce at present-day prices	$86,718,000
Cost to reproduce at present-day prices, less cost to recondition	81,718,000
Cost to reproduce at present-day prices, less straight line depreciation	65,546,300
Cost to reproduce at pre-war prices	48,552,200
Cost to reproduce at pre-war prices, less cost to recondition	46,552,200
Original cost	44,910,000
Original cost, less cost to recondition	42,910,000
FIGURES FROM COMMISSION'S BUREAU OF VALUATION REPORT	
Cost to reproduce at present-day prices	$70,723,800
Cost to reproduce at present-day prices, less depreciation	49,788,800
Cost to reproduce at pre-war prices	48,552,200
Cost to reproduce at pre-war prices, less cost to recondition	46,552,200
Original cost	32,580,000

The normal earning power of the system as constituted at present was estimated at $1,200,000 per annum. It was further estimated that with certain suggested changes, requiring no added capital expenditure, the net earnings would be increased to $1,600,000 per annum, and, with an expenditure of $3,000,000 for new cars, to $2,000,000 per annum. The annual fixed charges would be between $967,500 and $1,000,000.

The commission says that the objections raised by Mr. O'Shea, the stockholder, and on behalf of the Columbus & Ninth Avenue bondholders, cannot be considered, as they involve matters not within the power of the commission.

Job E. Hedges, receiver of the railway since March, 1919, handed his resignation of Federal Judge Mayer on July 10 with a request that he be relieved of his duties. Hugh J. Sheeran, his assistant, will be in charge until the receivership is lifted.

The plan of reorganization has been approved by the court.

Kewanee Purchase and Rehabilitation Financed

Spencer Trask & Company, New York, offered for subscription on July 9 at 95 and accrued interest, yielding more than 6.40 per cent, $1,200,000 of first mortgage 6 per cent gold bonds, Series A of the Kewanee Public Service Company, Kewanee, Ill. The proceeds of the issue will be used by the company to take over the properties of the Consolidated Light & Power Company in Kewanee, Neponset, Sheffield and Galva, to take over the municipal plant built by the city of Kewanee and to acquire the street railway and interurban properties.

As explained in the ELECTRIC RAILWAY JOURNAL for June 28, page 1030, the Kewanee Public Service Company will own and operate the electric light and power, gas and street railway business in Kewanee, the gas business in Galva, and will do electric light and power business in Sheffield and Neponset. The company, through its subsidiary, the Kewanee & Galva Railway, will also operate a short interurban line connecting Kewanee and Galva. Among other things the successful consummation of the purchase plan by B. F. Lyons, vice-president and general manager of the Beloit Water, Gas & Electric Company, means the resumption of local railway service in Kewanee, discontinued some months ago, and the rehabilitation of the interurban railway connecting Galva and Kewanee.

The voters of Kewanee on June 14 granted the Kewanee Public Service Company a franchise to operate the electric and gas utilities in Kewanee for a period of twenty-five years. The railway franchise, granted at the same time, extends for a period of twenty years, the longest term obtainable under the Illinois law. The Kewanee & Galva Railway is organized under the Illinois Railroad Law and its franchise extends for a period of fifty years. Other franchise are considered to be satisfactory. The rehabilitated properties will be under the direction of Mr. Lyons.

40,000 Fewer Riders in Toledo in May than in February

A severe drop in patronge brought about a deficit of $32,719 to the fare stabilizing fund of the Community Traction Company, Toledo, at the end of May. Acting Commissioner E. L. Graumlich so reported to the board of control at its recent monthly meeting. As a result a balance of only $41,859 is left in the stabilizing fund. Riding in June showed a still further slump so that it appears likely the fund will soon be practically exhausted. The daily average number of revenue passengers in May was only 148,708. This compared with 182,092 in February.

Service was cut slightly to take care of adjustments in schedules. The industrial slump is said to be largely responsible for most of the decrease although the widespread use of the private automobiles in good weather has contributed to decreased riding. Patronage on the bus lines operated separately from the railway has also shown a like slump.

A new ordinance applying to main thoroughfares which makes it necessary for automobiles to stop before crossing a street on which there are car tracks has had the effect of reducing accidents in which autos and street cars were involved.

Unfavorable Conditions Reduce Patronage in Winnipeg

The thirty-first annual report of the Winnipeg Electric Railway, Winnipeg, Man., shows that the gross earnings for the year 1923 decreased $114,816 compared with 1922 and that the operating expenses decreased $60,823. The net income for the year was $64,975 less than that of 1922. After the payment of all fixed charges and making the usual provision for depreciation the company showed a net income of $669,360. From this amount there was deducted the dividends paid on preferred stock, amounting to $210,000, and also an additional allowance for depreciation amounting to $156,003. This left $303,348 to be transferred to the surplus account.

According to the report of the president and the directors, one of the most marked features of the year's operation was the contraction in gross earnings which resulted from changed economic conditions and the unusual weather. The temperature averaged much higher than usual, and largely to this fact is attributed a decrease of more than 2,000,000 in the number of people carried on the Winnipeg railway system.

During 1923 the company made substantial additions and improvements to its property. There were two extensions to the track of the railway system and a considerable portion of old track was rehabilitated. The rolling stock was increased by four new buses and a new bus route was opened up in the north end of the city. Considerable work was done also to increase the capacity of the various substations. The accompanying table shows the income account for the year ended Dec. 31, 1923.

INCOME ACCOUNT OF WINNIPEG ELECTRIC RAILWAY
For the Year ended Dec. 31, 1923

Gross earnings from operations			$5,280,407
Operating expenses, before charging depreciation			3,465,892
Net operating revenue			$1,814,515
Miscellaneous income			127,706
Gross income			$1,942,221
Deduct:			
Interest charges on debenture stock and bonds		$663,480	
Extinguishment of discount on securities		16,208	
City percentage and car license		168,192	
Taxes		162,470	
Miscellaneous non-operating expenses		2,975	
Other income deductions		58,496	
			1,071,821
Net income before charging depreciation			$870,400
Deduct:			
Depreciation			201,050
Net income transferred to surplus			$669,350
Surplus brought forward from 1922 as adjusted			$2,301,176
Net income transferred		$669,350	
Dividends on 7% cumulative preferred stock	$210,000		
Additional depreciation	156,002		
		366,002	
			303,347
			$2,604,523
Sinking fund appropriation			55,320
Surplus carried forward			$2,549,203

Twenty-One-Mile Illinois Road Sold

The East St. Louis, Columbia & Waterloo Railway, a 21-mile interurban electric railway connecting St. Louis with Columbia and Waterloo, Ill., has been sold to a St. Louis syndicate headed by Charles H. Lemp, vice-president of the Liberty Central Trust Company. The purchase price is put at $335,000 cash and "other valuable considerations."

The road does both a freight and passenger business. It enters St. Louis at the Eads Bridge through a leasing arrangement with the East St. Louis & Suburban Railway, the tracks of which it uses through East St. Louis and over the Eads Bridge. The road was owned by the Merchants & Manufacturers Investment Company, of which E. H. Conrades is president. The same interests own the stock of Donk Brothers Coal Company and the Troy & Eastern Railway, a steam coal road.

The East St. Louis, Columbia & Waterloo Railway is an Illinois corporation. The new owners are said to have purchased it as an investment.

Committee Reports Iowa Property in Fair Condition

The members of the committee representing the first mortgage bondholders of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., recently inspected the property. E. V. Kane, chairman of the committee, in a circular dated June 15, reported on the conclusions of that trip. He stated that the line was in a fair physical condition with the exception of a 20-mile stretch from Waterloo to Waverly. General business conditions in the territory served were still quiet with a slowly improving tendency.

The current earnings from freight traffic on the Waterloo line reflected the improving trend of general business but the small gain has been overbalanced by the continued decline in passenger traffic due to bus competition and the general use of the automobile. The statement of operations for 1923 versus 1922, showed a balance in 1923 of $29,900 against a balance of $67,029 in 1922. There was an increase in operating expenses also, which according to the report was due largely to the fact that maintenance of the road had been deferred in previous years to be taken care of in 1923. Further, the committee stated that it believed that any substantial improvement in the affairs of the company must come from increased freight revenue.

Again a large amount of accumulative unpaid taxes, inherited from the old management, had imposed a heavy burden upon the company as these obligations were being liquidated in monthly installments out of current earnings.

First mortgage bonds to the par value of $5,114,000 have been deposited with the committee. This amount is approximately 90 per cent of the total issue outstanding.

Detroit Dividend Action Expected July 21

Elliott G. Stephenson, president of the Detroit United Railway, has called a shareholders' meeting for July 21 to authorize the new $10,000,000 bond issue. He has promised that the shareholders' question regarding dividends will be answered then. The Canadian *Financial Post* says that the sinking fund provisions of the new bond issue are such that an accumulation of earnings will have to be built up and this can only be done, it is considered in Toronto, by passing the dividend.

The letter of the president to the shareholders goes into the reasons for the new financing very thoroughly. The sum and substance of it is that the company must relieve the city of Detroit of the mortgage on the interurban lines of the company and this can only be done through the issuance of new bonds covered by notes. At the same time to complete the whole job at once an 8 per cent first mortgage issue is being redeemed, provision is being made for other issues that are falling due, working capital is being enhanced and money is being provided for new extensions. The new financing is being arranged on rather favorable terms, the 6 per cent five-year notes having been offered to the public on a 6.20 per cent basis.

The *Post* says that looking ahead one can see prospects of remarkable improvement in the company's affairs in the next few years, when a great deal of solid strength will have been built into the system by investment of new capital, by reinvestment of capital through sinking fund operations and by retirement of mortgages.

New York Interurban Would Abandon Branch

The Olean, Bradford & Salamanca Railway has petitioned the Public Service Commission for permission to discontinue the operation of its Little Valley division, remove its tracks and dispose of the right-of-way. The branch line runs between Salamanca and Little Valley, the county seat of Cattaraugus County. It is 9 miles in length.

The petition shows that the Little

Valley branch was built by the Western New York & Pennsylvania Traction Company about 1907 and that it has been in continuous operation since. Much loss of patronge has resulted to the division by the construction of a concrete highway between Salamanca and Little River, the petition claims, so that for some years past the line has been operated at a loss. The gross passenger revenue last year was only $9,620, the petition says.

Another reason advanced by the company for desiring to abandon the division is the increasing costs for power. When the line was constructed the Western New York & Pennsylvania Traction Company developed its own power from gas from fields in and around Ceres, N. Y. which the company owned. The production of these fields has dwindled to such an extent that it is not now possible to use gas, and power is purchased. This has added to the cost of operation.

American Electric Power Deal Concluded—New Directors

Nine new directors were elected on June 27 at a reorganization meeting of the American Electric Power Company, Philadelphia. They are: Sidney Z. Mitchell, chairman of the board and president of the Electric Bond & Share Company; George Breed, chairman of the American Gas & Electric Company; George M. Tidd, president of the latter company; Frank B. Ball, vice-president and secretary of the American Gas & Electric Company; F. W. Drager, treasurer of the same company; H. S. Reynold, vice-president of the Appalachian Power Company; C. N. Mason, president of the New River Power Company; C. P. Hamilton, president of the General Electric Securities Corporation, and W. Graham Clayton, chief engineer of the American Electric Power Company.

Six of the former directors who continue upon the board are: Van Horn Ely, Walter H. Lippincott, E. Clarence Miller and Charles L. S. Tingley, Philadelphia; Thomas W. Wilson, Wilmington, Del., and Alexander C. Robinson, Pittsburgh.

Mr. Tidd has been elected first vice-president, succeeding John Gribbel. Mr. Ely remains as president, and other officers also continue under the new ownership.

Approximately 95 per cent of the common stock of the American Electric Power Company was deposited under the offer of the American Gas & Electric Company and the Appalachian Power Company. The Bank of North America & Trust Company has been notified to pay $62.50 for any additional stock, which might be turned in, although the time limit of the offer expired on June 27.

As explained previously in the ELECTRIC RAILWAY JOURNAL, the American Electric Power Company is the successor under reorganization to the American Railways. Included among its railway properties are the Scranton Railway, Altoona & Logan Valley Electric Railway, Chicago & Joliet Electric Railway, Ohio Valley Electric Railway and the Wilmington & Philadelphia Traction Company.

Terms of St. Louis Bus Purchase Opposed

The committee representing the bondholders of the St. Louis Transit Company have declined to accept the terms of John Hertz, Chicago, of $2,400,000 for the local St. Louis bus lines. Members of the committee representing the bondholders of that company are said to have taken the position that the purchase of the property, which is being operated solely on a permit from the Board of Public Service, is too hazardous and that the price asked is too high. However, it is stated that the decision of the committee is not irrevocable and the hope is still entertained that the sale may be perfected.

Failure of the reorganization committee of the United Railways to reach an understanding with the suburban bondholders is said to have affected the decision of the Transit committee on the bus line purchase. J. K. Newman, a member of the reorganization committee, had proposed that the holders of the $6,500,000 of Suburban bonds outstanding accept $2,000,000 cash and $4,500,000 in securities of the reorganized company for their holdings. The Suburban holders have been inclined to insist on payment in full or the return of the Suburban properties.

Three Portsmouth Lines Abandoned

The Virginia Corporation Commission has authorized the Virginia Railway & Power Company to abandon three of its lines in Portsmouth. The company had operated the lines at a loss for some time, but it did not act to discontinue them until after the city had granted jitney lines the right to compete with the traction system. The attempt will be made to serve the people of Portsmouth in the abandoned territory by rerouting the jitney lines.

Byllesby Makes Offer for California Railway & Power Stock

H. M. Byllesby & Company, Chicago, Ill., have made an offer of $65 a share for the prior preference stock of the California Railway & Power Company, which owns all the capital stock, except directors' qualifying shares, of the Sierra & San Francisco Power Company.

As just indicated, the California Railway & Power Company is a holding company. It is controlled through stock ownership by the United Railways Investment Company. Its authorized capital stock includes $5,000,000 prior preference stock, of which $2,300,000 is now outstanding. By securing a certain amount of this prior preference stock, Byllesby & Company, it is understood, will be in a position to complete purchase plans for the Sierra & San Francisco Power Company. The latter company, which has $20,000,000 capital stock and $20,000,000 funded debt, is at present leased to the Pacific Gas & Electric Company. The California Railway & Power Company also owns certain equity shares of the Market Street Railway, San Francisco.

It is the opinion of Byllesby & Company that the Sierra & San Francisco Power Company may be operated profitably if combined with properties adjacent to it, such as, for instance, certain Byllesby properties. In this connection they say they are interested in purchasing a certain number of shares of the prior preference stock in order eventually to obtain a controlling interest in the Sierra & San Francisco Power Company.

Railway in Astoria, Ore., Abandons Service

Buses replaced the electric cars in Astoria, Ore., on June 29 and now afford the only means of public transportation in that city. The railway system, which has been in operation more than forty years, under the direction of the Pacific Power & Light Company, ceased functioning on that date. A fleet of twenty-five-passenger Mack buses is now in use there, operated by the Astoria Transit Company.

As long ago as last December it was indicated that the railway at Astoria would probably be abandoned. The system is one of a little more than 5 miles. A year and a half ago an area of thirty-five city blocks was wiped out by fire and the railway and the power and light lines of the company were damaged to the extent of about $175,000. More than fourteen blocks of railway track was destroyed. It had been estimated that the work of rehabilitating the railway would cost $150,000. As the railway was a losing proposition the company notified the local City Commission of its intention of abandoning operation.

Bills Owed to Municipalities Paid in Full by Kansas City Railways

The Kansas City Railways paid in full on July 2 all the bills and claims of Kansas City, Mo., and Kansas City, Kan., against it. The Missouri city received $141,950 and the one on the Kansas side $29,000. This indebtedness was incurred by the company before it passed into the hands of receivers on Sept. 9, 1920.

Kansas City, Mo., formerly claimed a total of $175,850, but an agreed reduction in the inter-city viaduct rental and counter claims for street repairs put in by the railway brought the amount down. The amount finally agreed upon was $22,000 larger than that offered by the company early this year to the retiring city administration.

Bankers Offer Illinois Power & Light Preferred

Blyth, Witter & Company, New York, N. Y., offered for subscription on July 10 at $95 a share plus accrued dividend, yielding 7.37 per cent, $5,000,000 of 7 per cent cumulative preferred stock of the Illinois Power & Light Corporation, Chicago. It was explained that $2,600,000 of the issue had been placed privately. The Illinois Power & Light Corporation owns and operates or controls electric power and light, gas, heat and city railway properties in a large number of the most populous and prosperous municipalities in Illinois. The corporation also controls, through ownership of the entire capital stock, Illinois Traction, Inc., which owns an extensive and profitable system of trunk line electric railroads in Illinois, and other utilities of which the most important are the Des Moines & Central Iowa Electric Company and the Kansas Public Service Company.

Property at El Paso, Tex., Expands.—The El Paso Electric Railway has purchased the plant of the Las Cruces Electric Light & Ice Company. The purchase price of the plant, including the cost of installations to be made, is said to total $275,000. The El Paso Electric Railway does both a railway and lighting business. Control of the company is vested in the El Paso Electric Company. Stone & Webster, Inc., are executive managers.

Atlanta Company Does More Financing.—Authority to issue $3,000,000 of thirty-year 6 per cent general mortgage gold bonds, maturing April 1, 1954, has been asked of the Georgia Public Service Commission by the Georgia Railway & Power Company, Atlanta. The proceeds are to be used for development of water power facilities in the vicinity of Tugalo, Tallulah and Burton dams, where the company has for years been carrying forward its program of hydro-electric development. On July 1 Estabrook & Company, New York, and Putnam & Company, Hartford, Conn., offered for subscription at 95, yielding 7.37 per cent, $2,500,000 of 7 per cent cumulative first preferred stock of the company series of 1924.

Wants to Purchase Line.—The Indiana Service Corporation, Fort Wayne, Ind., has filed a petition with the Public Service Commission asking for authority to purchase 95 per cent of the capital stock of the Ft. Wayne & Northwestern Railway. The property, which it is proposed to purchase, includes a traction line from Ft. Wayne to Garrett and Kendallville, Ind. The petition said the purchase price for the capital stock would be $448,000.

Petition for Permission for Abandonment Dismissed.—Justice Joseph Aspinall of the Supreme Court, sitting in Brooklyn, has dismissed the motion made by counsel for General Lincoln C. Andrews, receiver for the New York & Queens County Railway, for permission to abandon the lines and forfeit their franchises. The court ruled, however, that this dismissal does not prejudice a later presentation of the motion, if conditions should warrant such a course. It appeared during the hearing that the receiver desires to keep the motion open, so that it may again be presented if the City of New York should in any way compel a reduction of the 6-cent fare now being collected on the lines of the company under an order from the New York Transit Commission.

Line Goes Out of Business.—A recent court decree terminated the operation of the Sunbury, Lewisburg & Milton Electric Railway, Sunbury, Pa. The company was organized thirteen years ago, but only 1½ miles of the track was built. This line was used principally by shopmen of the Pennsylvania Railroad.

Interurban Would Abandon Short Line.—Application has been made to the Maryland Public Service Commission, Baltimore, by the Washington Interurban Railroad, controlled by the Washington Railway & Electric Company, for permission to abandon 1.57 miles of rail service between Bladensburg and East Riverdale, Md., until a new highway is completed between these points. Upon completion of the highway the company wants to substitute bus service. The commission will hold a hearing on the subject on July 23.

Receivership May Be Lifted in August.—Under the plans for its reorganization two separate companies will take over the properties of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., which has been operated by a receiver for several years. As a first step in the reorganization the Buffalo & Erie Railway has been incorporated to operate in Erie and Chautauqua Counties with headquarters at Erie, Pa. It will take over the interurban division between Erie, Pa., and Buffalo, N. Y., while the Erie Railway will take over and operate the local lines in the city of Erie, Pa. It is expected that the receivership will be lifted early in August. As noted in the ELECTRIC RAILWAY JOURNAL for July 5, page 33, the capital stock of the Buffalo & Erie Railway consists of 7,005 shares of preferred at $100 per share and 30,000 shares of common stock of no par value.

Receiver for Massachusetts Road.—The Milford, Attleboro & Woonsocket Street Railway, Milford, Mass., has been placed in the hands of Clark V. Wood, president of the company, as receiver, by Judge Wait in the Massachusetts Supreme Court. The company has a stock liability of $315,000, all to the New England Investment & Securities Company. It has paid no dividend since 1914. It has a floating indebtedness of $59,198. Mr. Wood has been instructed by the court to prepare an inventory of the property within sixty days. About 30 miles of track are operated by the company. The road connects Woonsocket, R. I., with Blackstone, Milford, Franklin, Plainville, Bellingham, Hopedale, Mendon and Wrentham in Massachusetts.

Reduction in Capital Stock Authorized.—The Lafayette Street Railway, Inc., Lafayette, Ind., has petitioned the Indiana Public Service Commission for authority to reduce its authorized capital stock from $200,000 to $100,000. At present only $80,000 of the authorized capital has been issued.

Book Reviews

Principles of Railway Transportation

By Eliot Jones, Ph.D., professor of economics, Leland Stanford University. 607 pages. Published by the Macmillan Company, New York, 1924.

While this book is designed primarily to serve the needs of teachers of elementary railroad transportation, it is stated that it is a reference book that will appeal to the general reader who desires an unbiased understanding of the fundamentals of the railroad situation. A great deal of the book is taken up with railroad history. Not only does this include the early history of the railroads, but a history of legislation prior to the World War, a very complete chronicle of events during the war, and the principal developments since that time, including a discussion of the operation of the Esch-Cummins act of 1920.

Arc Welding Handbook

By C. J. Holslag, Chief Engineer, Electric Arc Cutting & Welding Company. Published by the McGraw-Hill Book Company, Inc. New York, N. Y. 1924. $2.

This book provides a simple and practical manual of instruction in arc welding. The various methods and equipment in general use are described and the individual processes are taken up step by step in a simple manner so that the beginner can understand both the equipment and the welding process. A number of questions are asked at the end of each chapter for assistance in case the book is used as a text.

Chapters, are given on various details of welding, such as bead forming, spread welding, padding, lap, butt, tank and boiler welding. The book also contains recommendations for setting up the equipment of various types of electric welding apparatus and descriptions of useful welding methods. Information is included for men in a supervisory capacity, so that the owner, manager, foreman and others may have specific information in regard to their welding problems.

New York, New Haven & Hartford Railroad Electrification

Published by Westinghouse Electric & Manufacturing Company with the co-operation of officers of the New York, New Haven & Hartford Railroad, June, 1924. 43 pages, 8½x11.

This attractively arranged booklet contains a description of the electrification of the New Haven Railroad between Grand Central Terminal in New York and the Cedar Hill freight terminal east of New Haven. In addition there is a brief account of the minor electrical installations of the railroad, the first of which, the Nantasket Beach branch, dates back to 1895. This is stated to be the first example of electric power applied to steam railroad operation in this country.

The book includes technical descriptions of the track and overhead system, power generation and distribution, the signal system, locomotives and multiple-unit cars, equipment maintenance practices and facilities, service and results of operation. This electrification, it is stated, has 590 track-miles supplied by the 11,000-volt, single-phase overhead trolley system and includes the largest electrified yard in the world. The equipment includes the most extensive single homogeneous signal system in the world. The book is an excellent record of recent progress.

Personal Items

Ross Schram in Charge

Former Assistant General Manager at Detroit Placed in Full Charge of 400-Mile Municipal System

Much of the success that has attended the operation of the municipal railway in Detroit is attributed by the Street Railway Commission to the vigor and enthusiasm of Ross Schram, who has just succeeded William B. Mayo as general manager of the Detroit Department of Street Railways. Mr. Schram's first activity in public life in Detroit dates from the time he was named as secretary to Mayor-elect James Couzens in 1918, just preceding the controversy between the Mayor and the Detroit United Railway. When the start was made in 1919, on the construction of the first of the municipal lines as the nucleus of Detroit's present system, Mr. Schram was made secretary of the Street Railway Commission. The duties of that position he performed in addition to being the Mayor's secretary.

MAYOR'S POLICIES CARRIED OUT

Mr. Schram was familiar with the policies of Mr. Couzens and knew the program the former Mayor had mapped out, and when he was named assistant general manager of the D. S. R. on Dec. 23, 1921, as aid to the late Joseph S. Goodwin, then general manager, Mr. Schram became still more active in street railway affairs. Mr. Goodwin concerned himself largely with the details of practical street railway operation while Mr. Schram was instrumental in carrying out the Couzens policies when the railway system expanded to a point where the former Mayor could not devote the necessary time to street railway affairs.

Upon the death of Mr. Goodwin, Mr. Mayo resigned his place on the Street Railway Commission to become general manager of the railway and Mr. Schram continued as assistant general manager. Mr. Mayo has many outside interests, notably with the Ford company, and it was his idea that Mr. Schram should be put in charge as general manager as Mr. Schram had really been acting as chief executive but without the full credit and responsibility and without the pay of the position.

It has often been said that the occasion produces the man. This has certainly been true in the Detroit case. In a way Mr. Schram was hurtled into one responsibility after another at Detroit. The advisability or inadvisability of municipal ownership entirely aside from the question, Mr. Schram's record of accomplishments appears destined to stand the test of time. And after all is said and done there lies the criterion of greatness. Mr. Mayo's own recommendation of Mr. Schram is in itself a glowing tribute to the ability of the new manager, for Mr. Mayo, a man of great talent and wide experience, in the best possible position of all to judge the matter, has said in effect that Mr. Schram's record entitled him to full credit and full responsibility.

It is well to consider just what that means. It means the direction of 378 miles of city railway with nearly 1,500 cars, a big responsibility for a man only thirty-six years old. It is also well to consider the past. Since the city took over the local lines they have been largely rebuilt physically. Some of the other accomplishments include the addition of more than 500 cars, representing an increase in rolling stock of approximately 45 per cent, and the construction of nearly 50 miles of new line. Operating first on a 5-cent fare and later on a 6-cent fare, the municipal system has maintained itself and met all payments on the Detroit United Railway purchase price, approximately 25 per cent of which is now paid off. It is true that Mr. Schram has been aided in the work at Detroit by some of the best engineering and management talent in the country, but, after all, the credit of accomplishment is largely his.

Ross Schram

Mr. Schram was born in Battle Creek, Mich., in September, 1888. He became connected with Detroit affairs as municipal representative for the Detroit *News*. This was after his graduation from the Detroit University School. Later he entered the automobile field and was connected with the Charles H. Fuller Company, advertising agents, Chicago, handling the Overland, and with the J. Walter Thompson Company, New York, handling the Ford account. He was also associated with the Packard Motor Car Company as editor of the Packard house organ. For two years he was an automobile dealer in Ottawa, Ont.

Chicago Surface Lines Promotions Announced

Recent changes in personnel announced by the Chicago Surface Lines are as follows:

F. L. Kriete promoted to general attorney. He will also have charge of the department of accident investigation. Mr. Kriete succeeds John R. Guilliams, recently appointed general counsel in charge of the legal department of the company.

E. H. Altemeier promoted from assistant division superintendent to division superintendent in charge of second division.

Floyd J. Frank promoted to assistant division superintendent in charge of fifth division.

E. L. Brookman promoted to assistant division superintendent in charge of tenth division.

George T. Connor has been named general superintendent of the Moose Jaw Electric Railway, Moose Jaw, Sask., succeeding the former general superintendent, H. A. McLean. Mr. Connor has resided at Moose Jaw since August, 1911. He was born in Hillsborough, N. B., in February, 1891, and served his apprenticeship in engineering with the Portland Iron & Steel Company, Portland, Me. In 1911 he assisted in laying the bedplate of the first power unit of the Moose Jaw company's power plant and for nine years was in charge of this plant, a pioneer Diesel installation in the West. Since the railway's own plant was shut down and the railway has been purchasing power from the city power plant, Mr. Connor has acted for the company in the capacity of assistant to the superintendent.

Daniel F. Lewis's name was omitted as one of the past presidents of the New York Electric Railway Association in the report of the annual convention of that body in the issue of June 28. This was an oversight. In the report of the meeting the statement was made that the newly elected president of the association, C. E. Morgan of the Brooklyn City Railroad, was the first officer of that company to be elected president since 1882. As a matter of fact, Daniel F. Lewis was elected president of the association in 1890-91, when he was president of the Brooklyn City Railroad.

F. C. Chambers, president and general manager of the Des Moines City Railway, Des Moines, Iowa, was reelected president of the Iowa Electric Railway Association at the annual meeting at Fort Dodge, on June 24 and 25. A portrait and a biography of Mr. Chambers were published in the ELECTRIC RAILWAY JOURNAL for June 21, 1923, on the occasion of his election to head the association.

F. A. Persons has been appointed superintendent of the Greenfield-Turners Falls, Mass., line, which has been taken over by the towns of Greenfield and Montague for operation under the state transportation area act. Early in his career he was in the employ of the Concord, Maynard & Hudson Street Railway, serving in the mechanical, accounting and operating departments. He was made superintendent in 1909. Prior to that he was connected with the Connecticut Valley Street Railway, Greenfield, Mass. In the fall of 1913 Mr. Persons was appointed to the position of superintendent of motive power and equipment of the Massachusetts Consolidated Railways, Greenfield.

Obituary

Benjamin G. Lamme

Benjamin G. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Company and one of the pioneers in developing methods of high tension transmission, died on July 8 at his home at East Liberty, Pa., at the age of 60 years.

Many tributes have been paid to Mr. Lamme, but his characteristics and accomplishments have, perhaps, been most succinctly stated by one of his associates who said in effect that Mr. Lamme was one of the silent leaders of the engineering industry, a man whose genius was expressed in creative effort, whose vision covered a range beyond immediate problems, and whose work is a monument to their memory. Mr. Lamme typified during his life not only the spirit of research and experiment but the spirit of practical achievement.

Mr. Lamme was a prolific inventor, 150 patents standing to his credit. He was largely instrumental in the perfection of many alternating-current devices. Numbered among his early achievements was the design of the famous 5,000-hp. "umbrella-type" generators for use at Niagara Falls. He also designed the generating and motor equipment for the New York, New Haven & Hartford Railroad, following this by electrification work on the Paoli section of the Pennsylvania Railroad and on the Norfolk & Western Railroad. His work on the synchronous converter he regarded as one of his greatest achievements. For years he fought the battle for it almost single-handed. He won out, and this is now the accepted machinery for converting alternating current into direct current.

Mr. Lamme had long held the belief that the success of heavy electric railroading lay in the use of a high-voltage alternating current on a single overhead trolley. The main difficulty lay in finding suitable ways and means for utilizing the single-phase alternating current. After several attempts he succeeded in designing a series commutator type of motor with suitable characteristics, which he described along with the system of power distribution in a famous paper before the American Institute of Electrical Engineers.

Following his graduation from Ohio State University Mr. Lamme entered the employ of the Westinghouse Company in 1889 at $30 a month. Although he had little opportunity to study electricity in college, there being no course in electrical engineering at that time, he became deeply interested in the subject and read all he possibly could about it. Owing to his skill in mathematics he was assigned by the Westinghouse company to the task of studying the natural laws to which electrical phenomena were subject and of finding methods for the calculation of electrical machines in accordance with those laws.

An outstanding trait in Mr. Lamme's character was his interest in young engineering students. For years he made a study of the young technical graduates who entered the Westinghouse Electric organization, analyzing their abilities and characteristics to adapt them to the work to which they were best fitted. He maintained a design school for these men, in which he gave actual instructions, so that today the methods and knowledge of this great engineer have been passed on to the vast Westinghouse engineering body, and will stand as an inheritance to these engineers in years to come.

His tastes were simple and his modesty extreme. He had no flair for publicity and his name was not familiar to the man in the street, but his impress on the plastic industry with whose phenomenal growth his mature life was coeval, was deep and will be lasting.

Mr. Lamme was born on a farm near Springfield, Ohio, on Jan. 12, 1864. He entered Ohio State University in 1883, and was graduated in mechanical engineering in 1888, having been out of school for one year because of his father's death.

B. G. Lamme

Mr. Lamme was a fellow of the American Institute of Electrical Engineers. From the Institute he received the honor of being elected one of the two members from that body on the Naval Consulting Board during the war, and he was also made chairman of the inventions committee on that board. In 1919 he received the Edison medal from the Institute for his engineering achievements. Last year the board of trustees of Ohio State University awarded him the Joseph Sullivant medal in recognition of the value of his work to the world.

Hiram B. Stubblefield

Hiram B. Stubblefield, purchasing agent for the Nashville Railway & Light Company, Nashville, Tenn., died in that city on July 6.

Mr. Stubblefield entered the street railway field in Nashville when the first horse-drawn cars made their appearance. He was then connected with a company operating the Woodland Street line and was so employed when the Broad Street line, the first to be electrified, did away with its horse-drawn vehicles.

With electrification of the roads came consolidation, and Mr. Stubblefield was elected secretary and treasurer of the McGavock & Mount Vernon Railroad, a consolidation. During the '90s, the McGavock & Mount Vernon and a small company operating in South Nashville were bought out by the United Electric Company.

Mr. Stubblefield left the railway business after the purchase and bought, with his brother, a ferry landing in Perry County. Five years later they sold out and bought some phosphate beds in Hickman County, which they continued to operate until ten years ago, when Mr. Stubblefield accepted the position as purchasing agent for the Nashville Railway & Light Company.

Mr. Stubblefield was born at McMinnville, Tenn., on Oct. 6, 1853, and was graduated from Hughes and Mims preparatory school and later received a B. A. degree from Emory and Henry College, Virginia.

C. N. Wilcoxon

C. N. Wilcoxon, former president of the Chicago, Lake Shore & South Bend Railway, South Bend, Ind., died suddenly by his own hand in his home at Michigan City, Ind., on July 7. It has been known that Mr. Wilcoxon was ill for some time and this illness is thought to have caused a depression, which ended in dementia.

Mr. Wilcoxon was born at Muncie, Ind. The early part of his business career was spent in the construction and management of gas and waterworks systems. In 1893 he accepted the position of general manager of the local street car lines at Muncie, Ind., where he remained until 1898, when he went to Decatur, Ill., as general manager of the Decatur Traction Company. During his association with this property the system was rebuilt and put on a substantial, paying basis. In 1901 Mr. Wilcoxon became general superintendent in charge of the operating department of the Western Ohio Railway, Lima, Ohio, where he remained until 1905, when he became general manager of the Cleveland, Southwestern & Columbus Railway. It was while acting in this capacity that he began to urge the various methods for promoting safety which today have become so important a part of transportation practice. Mr. Wilcoxon may be said to be one of the pioneers in the modern safety movement.

In 1909 he resigned his position with the Cleveland, Southwestern & Columbus to become general manager of the Chicago, Lake Shore & South Bend Railway. In 1914 he was also elected a vice-president of the latter company and later in the same year became president. This position he retained until April, 1924, when he resigned on account of ill health.

Mr. Wilcoxon served as president of the Central Electric Railway Association in 1917.

William Piper, for the last twenty years assistant superintendent of the Niagara Gorge Railway, Niagara Falls, N. Y., died on July 5 at his home in Lewiston, N. Y. He was 54 years old. Mr. Piper had been associated with the Niagara Gorge Railway since its organization in 1895. He is survived by his wife, a daughter and two sons.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

American Car & Foundry Earnings Increase

The net earnings of the American Car & Foundry Company, Berwick, Pa., for the year ended April 30, 1924, were $6,304,000, compared with $6,213,000 in the previous year. These earnings, which resulted from the subtraction of charges, Federal taxes and preferred dividends, are equal to $14.01 a share on the $30,000,000 of common stock compared with $13.71 a share a year ago.

	1924	1923
*Profit	$10,786,573	$10,633,562
Renewals, replacements	4,481,606	4,419,951
Net income	$6,304,967	$6,213,611
Preferred dividends	2,100,000	2,100,000
Common dividends	3,600,000	3,600,000
Surplus	$604,967	$513,611
Previous surplus	36,673,499	36,159,888
Total surplus	$37,278,466	$36,673,499

*After federal taxes.

W. H. Woodin, president of the company, said that operations were now between 75 and 80 per cent of capacity and that although buying of equipment had decreased, he anticipated satisfactory conditions when the crops had their analysis.

Barney & Smith Plant Sold Piecemeal

The piecemeal sale of the Barney & Smith Car Company's plant at Dayton, Ohio, has been approved by Judge Edward T. Snediker of the Montgomery County Common Pleas Court. The assets of the company were sold at public auction on June 12 by Master Commissioner Carroll Sprigg. The amount obtained in the sale was approximately $437,306. The court's approval virtually ends protracted litigation. The purchasers assume June taxes and assessments amounting to $38,951, making a sale value of $476,257.

The sale was held following a nationwide advertising and circularizing campaign. It was in charge of the Gerth Realty Experts, New York, auctioneers, and D. G. Boyd, Dayton, realtor. It was attended by machinery buyers from many sections of the country. The plan to parcel the real estate was conceived by the realtor in charge of the sale, after it became apparent that no manufacturers could be interested in the plant as a whole. The sale was considered a success because of the industrial outlook and the fact that all parcels were bid in at good market prices.

This was the fifth attempt to dispose of the holdings at the instigation of the receiver, Valentine Winters, Dayton banker. The sale was ordered by the court following foreclosure action in behalf of holders of the first mortgage bonds.

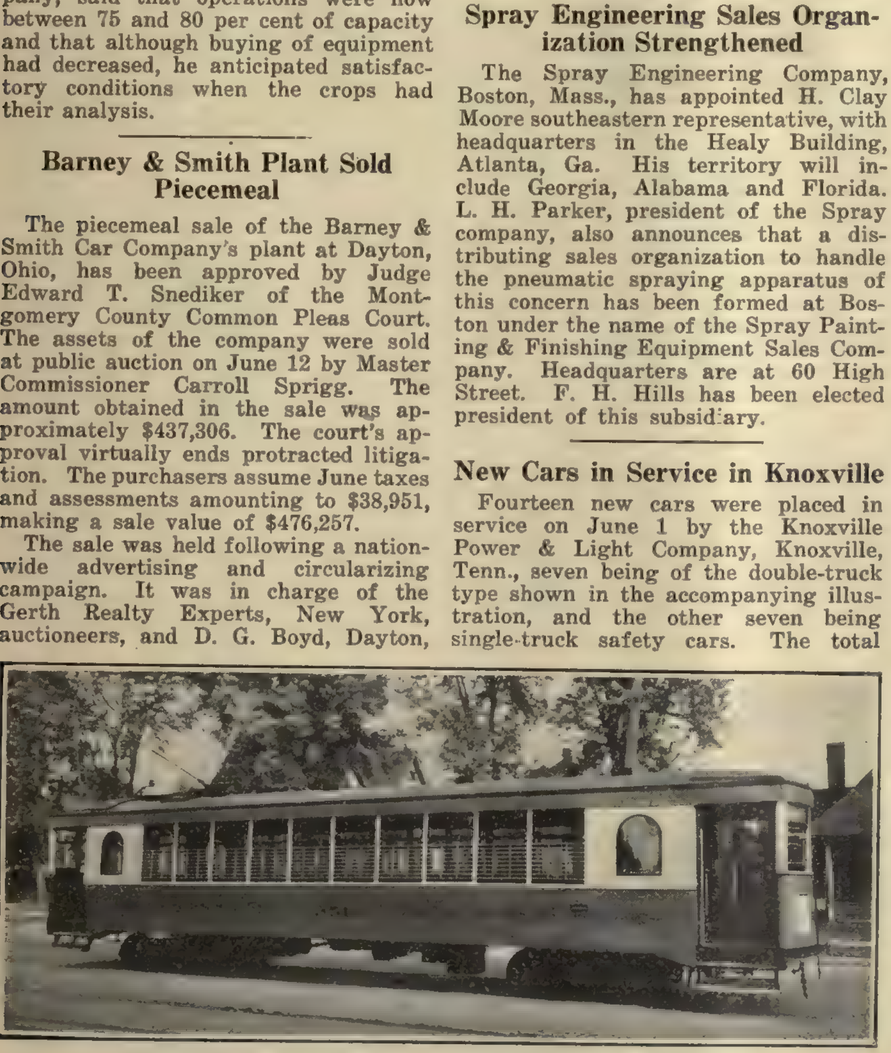
The plant comprises forty-seven acres of land and seventy-six buildings of various sizes. Most of them are said to be in a neglected condition. The plant has been idle for six years and it has been considered to be obsolete as a car-building establishment.

Spray Engineering Sales Organization Strengthened

The Spray Engineering Company, Boston, Mass., has appointed H. Clay Moore southeastern representative, with headquarters in the Healy Building, Atlanta, Ga. His territory will include Georgia, Alabama and Florida. L. H. Parker, president of the Spray company, also announces that a distributing sales organization to handle the pneumatic spraying apparatus of this concern has been formed at Boston under the name of the Spray Painting & Finishing Equipment Sales Company. Headquarters are at 60 High Street. F. H. Hills has been elected president of this subsidiary.

New Cars in Service in Knoxville

Fourteen new cars were placed in service on June 1 by the Knoxville Power & Light Company, Knoxville, Tenn., seven being of the double-truck type shown in the accompanying illustration, and the other seven being single-truck safety cars. The total cost of these cars, which were built by the Cincinnati Car Company, was about $134,000.



Type of Car Recently Placed in Operation in Knoxville, Tenn

New Railway Publications Issued By Westinghouse

The Westinghouse Electric & Manufacturing Company has released several new publications on steam railroad electrification, railway equipment, operating data, electric railway motors and controllers and also a leaflet on freight haulage.

Reprint 176, "Baldwin-Westinghouse Electric Locomotives," is a thirty-two-page publication covering the use of these locomotives for main line service.

Folder 4596, "An Exhibit of Modern Steam and Electric Equipment," consists of illustrations and certain pertinent data relating to the exhibit at the A. I. E. E. convention in Philadelphia, Feb. 4-8.

Folder 4587, "Suburban Transportation by Electricity," gives a summary of the equipment, distribution system and operating data of the Philadelphia-Paoli electrification of the Pennsylvania Railroad.

Eight new pages of operating data on railway maintenance are entitled:

"Assembly and Care of Jumpers and Receptacles."

"What Baking and Dipping Armatures Did for One Operator."

"The Maintenance of Electric Railway Car Wheels."

"Lightning Arresters and Their Application for Railway Equipment Protection."

"Special Armature Bearings to Fit Worn Shafts."

"Protecting Railway Motor Commutators at Front V-Ring."

"Shop Methods of Cleaning Detail Parts of Car Equipment."

"Wrenches and Hand Tools for Overhauling Railway Motors."

"Selection of Waste for Railway Motor Bearings."

"How to Reduce Temperature on Overload Motors."

Leaflet 20,153, "Type K-35 Controller," has also been released. This gives detailed specifications and dimensions of the K-35 KK standard railway controller and a diagram of connections for two controllers and four motors.

Leaflets 20,055-A and 20,148 cover specifications on the 535-A and 514-A railway motors respectively.

"Freight Haulage," Leaflet 20,174, sets forth briefly the benefits to be derived from the establishment of freight service on interurban lines.

In Leaflet 20,154, "External Fans for Non-Ventilated Railway Motors," is described the latest scheme developed for the improvement of the earlier types of non-ventilated railway motors.

Metal, Coal and Material Prices

Metals—New York	July 8, 1924
Copper, electrolytic, cents per lb.	12.375
Copper wire base, cents per lb.	14.75
Lead, cents per lb.	7.00
Zinc, cents per lb.	6.15
Tin, Straits, cents per lb.	44.00
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.325
Somerset mine run, Boston, net tons	2.15
Pittsburgh mine run, Pittsburgh, net tons.	1.875
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.675
Kansas screenings, Kansas City, net tons.	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.00
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags.	2.20
Linseed oil (5-lb. lots), N. Y., per gal.	$0.99
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.625
Turpentine (bbl. lots), N. Y., per gal.	$0.83

Rolling Stock

Long Island Electric Railway, Jamaica, N. Y., on July 7 suffered the loss of its carhouse at Jamaica and thirty cars in a fire which practically destroyed the plant. The equipment burned included eleven double-truck open cars, fifteen double-truck closed cars and four work cars. The total damage is estimated at $100,000, $15,000 of which represents the loss of the building. Service was continued with the remaining rolling stock and with cars borrowed from other properties. It has not yet been decided by the management just what will be done to secure equipment to replace that destroyed.

Richmond Light & Railroad Company, Staten Island, N. Y., has made available for publication the details regarding the twenty-five one-man two-man cars ordered from the Osgood-Bradley Car Company. The principal specifications are as follows:

Number of cars ordered	25
Name of road,	Richmond Light & Railroad Company
Date order was placed	Feb. 15, 1924
Date of delivery	Complete July 15, 1924
Builder of car body,	Osgood-Bradley Car Company
Type	Light-weight, double-truck one-man, two-man safety car
Seating capacity	44
Total weight	33,800 lb.
Bolster centers, length	21 ft. 4½ in.
Length over all	44 ft.
Truck wheelbase	5 ft. 6 in.
Width over all	8 ft. 4½ in.
Height, rail to trolley base	11 ft. 1½ in
Body, steel.	
Interior trim	Steel, stained cherry color
Roof	Arch
Air brakes,	Westinghouse, with DH-16 compressor
Armature bearings	Plain
Axles	A.E.R.A. standard
Bumpers	Channel anti-climber
Car signal system	Push button
Car trimmings	Bronze
Center and side bearings	Plain
Control	GE Type K with line switch
Curtain fixtures	Morton Mfg. Co.'s crown
Curtain material	Fabrikoid
Destination signs,	Hunter No. 8 illuminated
Door-operating mechanism,	National safety car equipment
Wheelguards	Root
Gears and pinions	General Electric
Hand brakes	Peacock staffless
Heater equipment	Consolidated
Headlights	Ohio Brass, golden ray
Journal bearings	Plain
Journal boxes	Symington
Lightning arresters	General Electric
Motor	Four G.E.-265, inside hung
Registers	Sterling-Meaker
Sanders	Ohio Brass, air type
Sash fixtures	Howard
Seats	Heywood-Wakefield 57-SK
Seating material	Rattan
Step treads	Kass Safety
Trolley catchers	Ohio Brass
Trolley base	Ohio Brass
Trolley wheels	General Electric
Trucks	Osgood-Bradley No. 30-66
Ventilators	Eight single exhaust type
Wheels	Cast iron, 26 in.
Special devices,	Air-operated gong and register ringing device.

Interurban Expects to Begin Bus Service Soon.—The Interstate Public Service Company, Indianapolis, expects to begin operation about Aug. 1 of twelve de luxe type buses on a 20-mile run from Indianapolis to Greenwood, Whiteland and Franklin, Ind. This service, to which reference has been made previously in the ELECTRIC RAILWAY JOURNAL, will parallel the interurban line and will take the place largely of the present local service over the interurban. The highway between Indianapolis and Franklin is paved all the way. This is the first bus operation entered into by the Interstate Public Service Company as such, though it has previously entered in a joint arrangement with independent bus operators.

Track and Line

Kansas City Railways, Kansas City, Mo., is putting in a street railway loop at Muehlbach Field for the benefit of the baseball fans. The cost of the work is $40,000. Of this amount the laying of the tracks cost $37,270. The rest of the amount is spent for property rights.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will soon begin building an extension on Center Street from Twenty-seventh Street to Thirty-fifth Street, connecting its Thirty-fifth and Twenty-seventh Streets one-man car lines. A franchise for this extension was recently granted by the Common Council.

Louisville Railway, Louisville, Ky., placed in operation on July 4 a new loop at the entrance to the Louisville Baseball Park of the American Association Club, which has a seating capacity of more than 20,000 people. The company carried a connecting line from Fourth Street through Avery Street to Second Street in order to run cars out Fourth Street headed for the ball park.

Pacific Electric Railway, Los Angeles, Cal., has started construction work on a double track tunnel to be 4,225 ft. long. The new tunnel will provide a more direct route for the Pacific Electric Railway cars from the business district of Los Angeles to Hollywood. The total cost of the project is to be about $3,500,000. Contract for driving the tunnel has been awarded to Twohy Brothers.

Power Houses, Shops and Buildings

Wilmington & Philadelphia Traction Company, Wilmington, Del., suffered damage to its property in a storm on June 25, amounting to approximately $40,000. An old carhouse at Sixth and Hawley Streets, housing forty cars, was demolished. The carhouse, formerly owned by the old Peoples Railway Line, stood next to the new carhouse. It is estimated that it will cost $30,000 to replace.

Pacific Electric Railway, Los Angeles, Cal., announces that due to the large increase in volume of freight and passenger traffic on its southern division lines, it proposes the construction of another automatic substation in the city of Los Angeles, near Twenty-fifth Street and Long Beach Avenue on its Long Beach four-track line. The new substation complete will cost approximately $104,000. Construction of the new station will begin soon. Upon completion of the new substation it will bring the total of the Pacific Electric power transforming stations in Southern California to fifty-three.

Trade Notes

Fort Pitt Spring & Manufacturing Company, Pittsburgh, Pa., is in no way connected with the Mitchell Spring Works, Johnstown, Pa., reported recently to have passed to a new company, known as the Mitchell Spring & Manufacturing Company. William McBride, president of the Fort Pitt Company, denies that he is a stockholder in the Mitchell Spring Works or its successor or that any members of the Fort Pitt company are interested in the Mitchell enterprise.

Portland Cement Association, Chicago, Ill., announces the appointment of L. N. Whitcraft as district engineer in charge of the Philadelphia office, 1315 Walnut Street, effective June 1. Mr. Whitcraft has been connected with the Portland Cement Association for eight years as field engineer attached to the New York office. For several years past he has been in charge of association work in New Jersey. Prior to joining the Portland Cement Association staff, he was county road engineer for Somerset County, Maryland, and chief engineer of the hydrated lime bureau of the National Lime Manufacturers' Association.

General Electric Company, Schenectady, N. Y., has announced that K. A. Hills, since January attached to the Davenport sales office of the General Electric Company, has been made manager of that office, covering a territory including a large part of the state of Iowa. Mr. Hills has been an employee of the General Electric Company since May, 1910. S. F. Gates, for fourteen years in charge of the Spokane office, has been appointed manager of the Los Angeles office. Bernhard Olsen, for twelve years employed in the Spokane office, has been appointed manager of that office, succeeding Mr. Gates.

Nic Le Grand, Inc., Rock Island, Ill., has received an order for seven positive safety equipments for the Toledo & Indiana Railroad. These are to go on new cars being built by the Cincinnati Car Company. The Le Grand Company has also received an order for its safety equipment for converted cars for the Wisconsin Public Service Corporation at Green Bay, Wis.

New Advertising Literature

Oxweld Acetylene Company, Long Island City, Chicago and San Francisco, has published a new forty-eight-page catalog illustrating and describing its extensive line of acetylene generators and oxyacetylene welding, cutting, brazing, lead burning, heating and decarbonizing equipment. The book is replete with information useful to the user or prospective user of oxyacetylene apparatus.

Foamite-Childs Corporation, Utica, N. Y., has issued a twenty-page booklet called "Dipping Dangers." The booklet describes among other things the application of Foamite protection to modern industrial fire hazards.

Will the motormen use it?

That's the test of an adequate hand brake!

Why install a hand brake at all, if the men don't know it, and trust it and use it when emergency demands it?

Perhaps they've never tried it; perhaps they've tried it and found it will not stop the car.

PEACOCK BRAKES

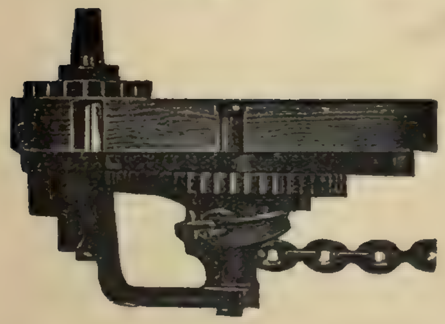
Inspire motormen's confidence

Many roads have recognized the importance of this phase of operation. They have installed Peacock Brakes and now require their operators to make at least one hand brake stop on every trip.

What does this accomplish? It insures a condition wherein every car operator knows how to use his hand brake and knows what it will do. Where it's a Peacock Brake, he knows he can apply sufficient braking force even to lock the wheels with a few turns of the handle.

Operators know that Peacock Brakes will stop the car.

Peacock Staffless Brake



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50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

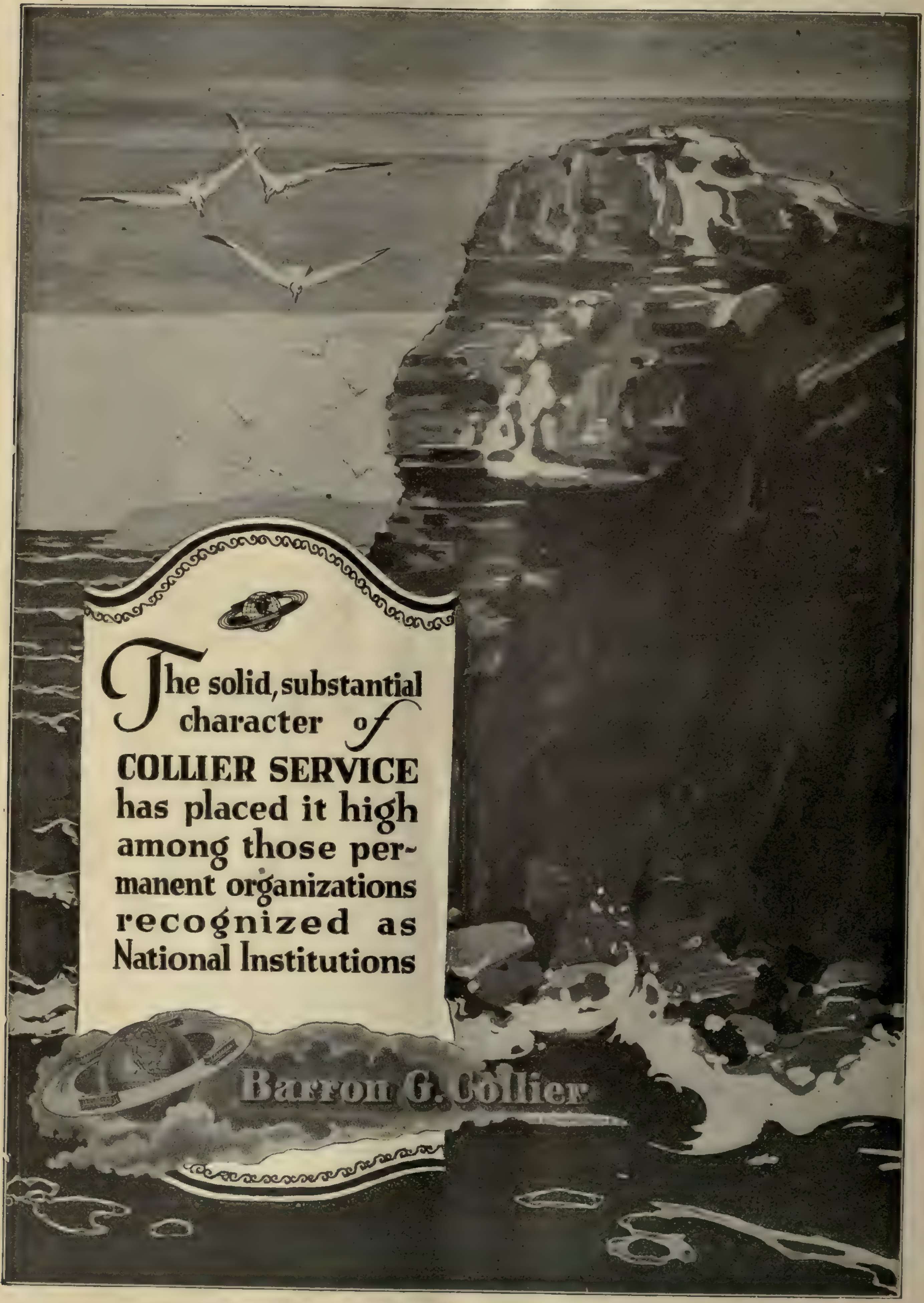
When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

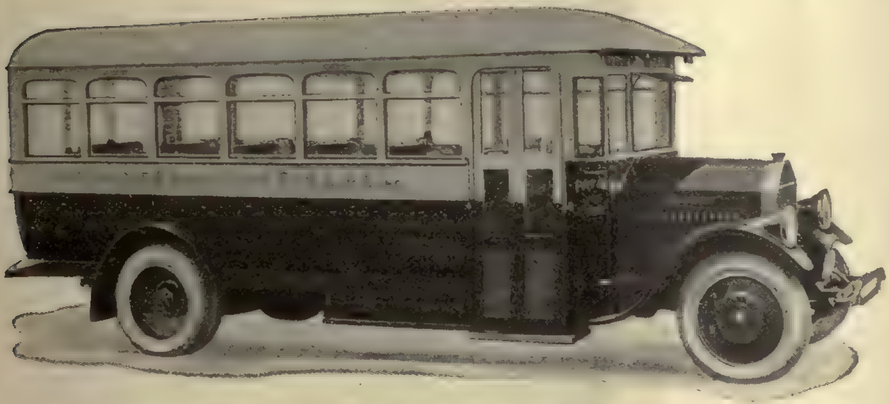
ARCHBOLD-BRADY CO.

Engineers and Contractors SYRACUSE, N. Y.


The solid, substantial character of
COLLIER SERVICE
has placed it high among those permanent organizations recognized as National Institutions
Barron G. Collier

GREATER COMFORT—GREATER SAFETY—GREATER SPEED—GREATER *PROFITS*

Pierce-Arrow Busses Provide Speed With Safety



This 25-passenger, 6-cylinder Pierce-Arrow motor bus operates daily between Port Chester and White Plains, New York—a distance of seven miles. The bus travels a total of about 175 miles daily.

Standard Chassis

$4600

for 196-in. wheelbase, $4750 for 220-in. wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost.

Terms if desired

Electric Railways which extend or augment their service by the use of Pierce-Arrow Six-cylinder Passenger Busses find that the following facts are true:

Pierce-Arrow busses, at high road speeds, ride with the smooth, vibrationless comfort of a big limousine. There is no careening or swaying—no jolting or jerking. This is due to the low build—the wide tread—the flexible springing.

Fast headway is maintained. Stopping is sure and safe.

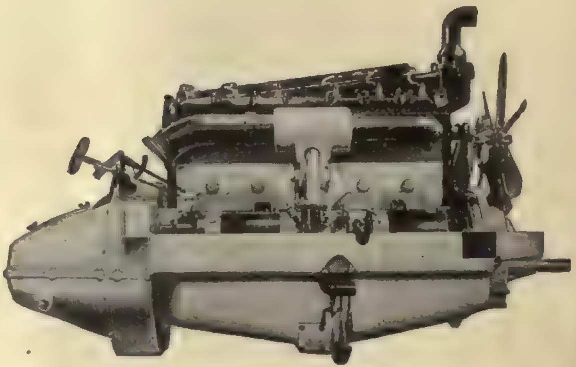
The unusual acceleration of this 100-horsepower bus—as velvety and smooth as a touring car—gives it increased earning ability—more trips per day—more profits.

Maneuvering is so easy—braking requires so little effort—gear shifting is so seldom required—operating quarters are so comfortable—that there is no driver-fatigue—even on the last run of the day. Prompt, efficient, *safe* operation is thus assured.

And, capping the climax, this beautiful, luxurious bus actually costs less to operate and to maintain than the usual converted-truck or elongated-touring-car make-shift.

Our engineers will be glad to go into details with railway representatives. A request will bring complete information about the bus.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.



The Pierce-Arrow 6-Cylinder Bus Engine

The silent, Dual-Valve, Dual Ignition Pierce-Arrow Bus Engine develops over 100 horsepower at 2500 revolutions per minute. It is so flexible that it will accelerate rapidly in high gear from a pace of two miles an hour to maximum speed.

Speed of from 45 to 50 miles an hour can be maintained readily, if desired—which means that lower rates of speed do not tax the engine to the limit.

The bus is propelled by a trouble-free inverted worm gear drive. The low-hung chassis has an unusually short turning radius.

* * * * *

The Pierce-Arrow Motor Bus chassis, produced in two lengths of wheelbase, will accommodate the de luxe, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

Pierce-Arrow

Keeping the Faith with Both Parties

A B P Standard No. 6
"To solicit subscriptions and advertising solely upon the merits of the publication."

THE A B P publication must be worthy of the consideration of both subscriber and advertiser, primarily on its merits. But the final, basic rule in determining all policies, is number one of our Standards—"To consider first the interests of the subscriber."

The good physician has nothing to sell but Service, his ability to treat human ailments. Should he sell pretense, cure-alls, or subterfuges, he becomes a quack. Likewise, the good business paper has nothing to sell but Service, and it is the avowed ambition of our publishers to render clean, honorable service to both subscribers and advertisers, of such a character as to command recognition for its own sake alone.

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"To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements subject to proper and authentic verification."

A NATURAL sequence of No. 6, as you perceive. In every business there must be standards of measurement, and we have taken a lead in enforcing a uniform method of measuring and counting circulation.

Every A B P paper must have its circulation records audited by The Audit Bureau of Circulations, which assures absolute accuracy and a standard unit of measurement.

This means a lot to advertisers, but it has a real significance for subscribers, too. The inevitable tendency of standardization in any business, is to *cut out waste,* to reduce costs, and to stabilize and define values.

The benefits of this policy are bound to reach the ultimate buyer in the form of reduced selling costs and better sales methods. Here again we are hewing to the line laid down by our Standard No. 1—"To consider first the interests of the subscriber."

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY

Davis "One-Wear" Wheels
on the
Washington Railway and Electric

FOR five years the Washington Railway and Electric have successfully used Davis "One-Wear" Wheels.

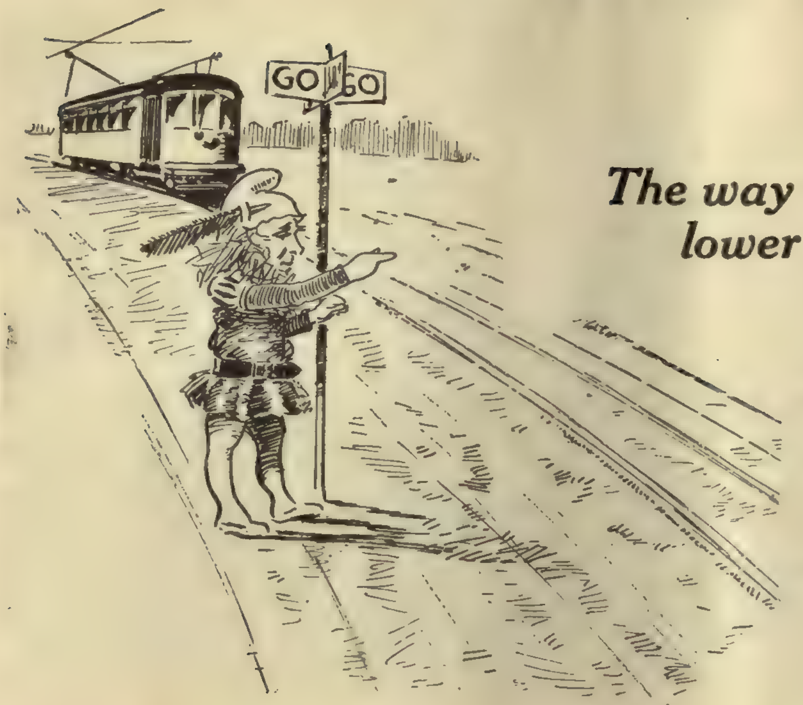
Davis Wheels have a long life that is developed without contour conditioning—a welcome relief to the repair shop.

Moreover the high resistance to impact possessed by Davis "One-Wear" Wheels reduces failures due to "slid flats", "shell outs" and other wheel troubles.

The Davis "One-Wear" Wheel is made of special steel, compressed by centrifugal action while the metal is molten. It is subjected to scientific heat treatment, resulting in great strength and resistance to wear.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
"ONE-WEAR"
STEEL WHEELS



*The way toward
lower maintenance cost!*

Use
Boyerized Parts

Brake Hangers **Center Bearings**
Brake Levers **Side Bearings**
Pedestal Gibs **Spring Post Bushings**
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Bolster and Transom Chafing Plates

They make the mileage!

Why shouldn't they, with a process behind them that gives a lease of several times the life of ordinary iron and steel products. The boyerizing process does this.

Are you getting the benefit of this kind of equipment? If not, a trial will convince you.

The
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*It's
Boyerized!
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Carnegie Axles

In 1858, a little forge shop in the outskirts of Pittsburgh started making axles. The equipment was crude and inadequate, but the product was reliable and soon won a reputation for itself.

This was the beginning of an organization that a number of years later became known as Carnegie Steel Company. Today the Howard Axle Works have replaced this modest shop. Here is every facility for correct heat-treatment. The work is personally supervised by experienced metallurgists. Accurate testing equipment has been provided and every precaution is taken to insure the actual meeting of the specifications in the finished product.

Carnegie Steel Company is equipped to furnish Car and Tender Axles, Engine Truck and Driving Axles, Electric Motor and Street Car Axles and miscellaneous forgings, annealed and quenched-and-tempered. More than sixty years of experience makes us confident we can serve you to advantage.

CARNEGIE STEEL COMPANY
GENERAL OFFICES—CARNEGIE BUILDING
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1695

STANDARD STEEL

The heavy torque and other forces operating in modern high speed motors is certain to cause failure in the Armature Shafts which are not built with the best material and type of workmanship to stand it.

"Standard Quality Shafts" are built not only from the pick of steel, but from experience extending back so many years that everything which can and should be used *is* used to produce a perfect forging. When you buy "Standard Forgings" you are assured of quality.

STANDARD STEEL WORKS COMPANY
PHILADELPHIA, PA.

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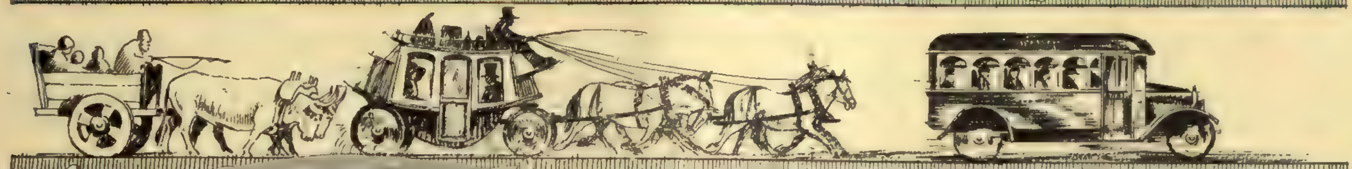


And now—

THE SIX WHEEL MOTOR COACH

Since man first learned to put wheels under a load, the development of transportation has largely depended on the better use of wheels.

First the two-wheel ox cart—then the four-wheel vehicle, increasing in speed and load capacity until the age of steam and electricity taught us the limitations of four wheels.

Engineers put more wheels under railway locomotives and coaches—and the improvement made four-wheel cars on rails forever obsolete.

The Motor car went back to the four-wheel principle, and developed it to the limits of its speed and load capacity.

Now comes a revolution in motor car design—the Six Wheel Coach! Thus Science has solved the problem of increasing, with safety and economy, the load which may be carried on our highways and the speed with which it may be carried. Here is a development of tremendous significance in the future transportation of the country!

C. M. Schwab.

Chairman of the Board
The Six Wheel Company

The SixWheel Coach

—by providing greater traction
—by doubling the number of brakes
—by reducing the shock of road impacts by one-fourth

This means speed, safety, comfort and long life for the coach

The first great advance embodied in the Six Wheel Coach lies in the four-wheel rear assembly.

This provides greater traction, and the braking advantage of four wheel brakes, all in the rear.

It makes possible, for the first time, the economical use of pneumatic tires on vehicles of large capacity.

It makes possible a much lighter coach to carry such loads. Power ordinarily used to move the dead weight of the coach itself, is freed to move the profitable load.

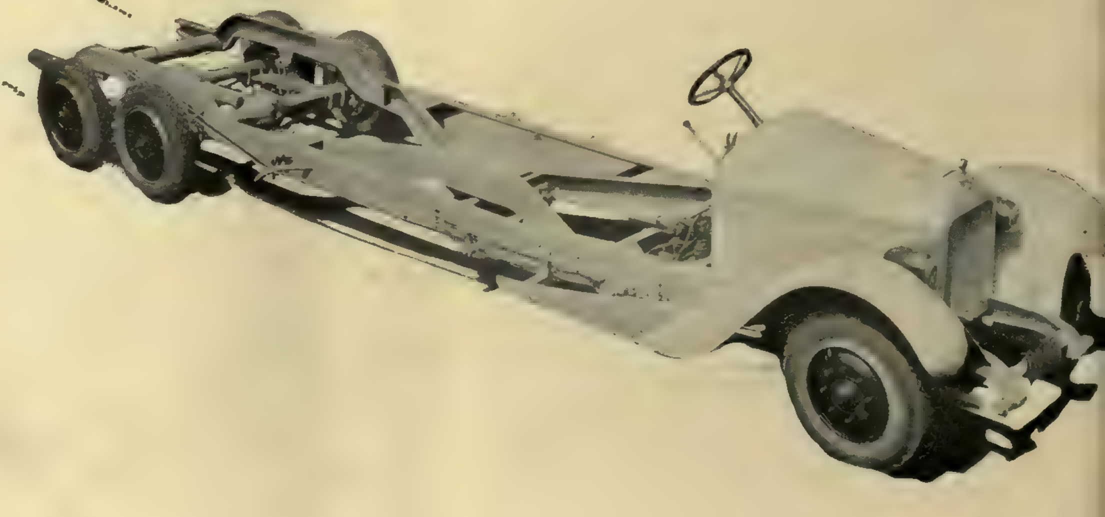
It makes skidding practically impossible.

It makes possible a speed of more than 50 miles an hour, with safety and comfort.

The second great advance embodied in the six wheel coach is the detachable motor unit. Radiator, engine, clutch and transmission—all in one assembly can be taken out and replaced in less than an hour. The entire rear-end assembly can be taken out and replaced in thirty minutes. For fleet operators, this means uninterrupted schedules—the dependability which the traveling public demands.

The third great advance is the extremely low center of gravity, contributing to speed with safety, convenience of getting in and out, and attractive appearance.

This greater traction and braking surface—the safe, low center of gravity—and the touring-car riding qualities—made it possible for a 5-ton sixwheeler, fully loaded, to cross from Los Angeles to New York in 6 days, 15 hours running time. The Six Wheel Coach gives highway transportation the reliability of a transcontinental train.



revolutionizes transportation

You can count on bigger profits from the SIX WHEEL Coach

—because decreased road shocks largely reduce depreciation and repairs,

—because readily interchangeable units make it possible to keep the Six Wheel Coach earning all the time,

—because increased speed (with greater safety) means quicker trips, and quicker trips mean *more* trips,

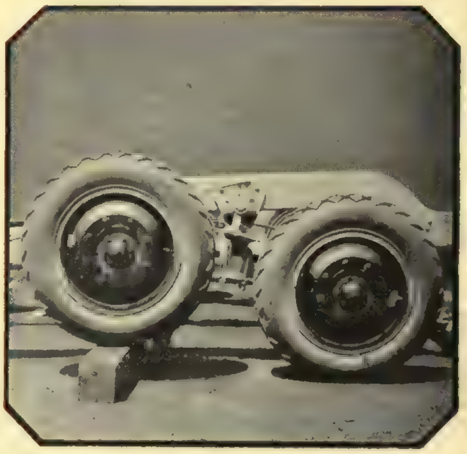
—because the increased number of wheels reduces all the factors of wear on tires, and greatly increases tire mileage,

—because a better grip on the road makes skidding virtually impossible and other causes of accident less possible.

In addition, the Six Wheel Coach will attract *more* passengers and *a new class* of passengers to bus transportation. It offers, for the first time on the highways, the speed, comfort, safety, luxury, and uninterrupted schedules which the traveling public expects of a common carrier. It creates a new feeling of friendliness toward bus transportation on the part of the general public, for it covers the highways without pounding them to pieces. The same qualities which save the car, save the roads.

Charles M. Schwab, after a generation of leadership in American industry, regards the six wheel principle as revolutionary in the progress of transportation, and he has placed his name and organizing ability behind it.

The Six Wheel Coach comes to you a complete unit of transportation. The all-steel body, with its de luxe refinements of design, arrangement, and finish, is the work of specialists in this organization with many years of experience in this field of manufacture. The powerful, silent, six-cylinder motor, the frame, the axles—every part which goes into the Six Wheel Coach—is the highest development of the World's leaders in these fields. The Six Wheel Coach is backed by an improved, doubly fortified system of national service.



Showing the flexibility of the four-wheel rear assembly. This patented assembly is pivoted on the frame midway between the two pairs of wheels. Therefore, an obstruction sufficient to raise one wheel 1 foot, raises the point of support only 6 inches. In other words, the shock of each road impact is cut in two.

This fact, coupled with the fact that pneumatic tires are used, reduces the shock of road impacts on the Six Wheel Coach to one-fourth the shock sustained by a solid tire vehicle of the same capacity. In a test conducted by United States Bureau of Roads, an ordinary 5-ton truck with new solid tires and carrying a load of five tons hit the road with a force of 29,000 pounds after going over a bump. A Six Wheel Truck, of similar capacity, and loaded with nearly nine tons, struck a blow of only 7000 pounds after hitting the same bump at the same speed.

THE SIX WHEEL COMPANY

PHILADELPHIA, U. S. A.

Seats that Sell Rides

For half a century Hale & Kilburn has specialized in designing seating equipment suitable for every type of passenger transportation and has originated all the important improvements in this line. H & K Seats are in use upon nearly every steam and electric railway in the United States. The new seat designed for the "SIX WHEELER" is the latest development in luxury and appearance.

Seats for every type of Motor Bus.
Write for description and prices.

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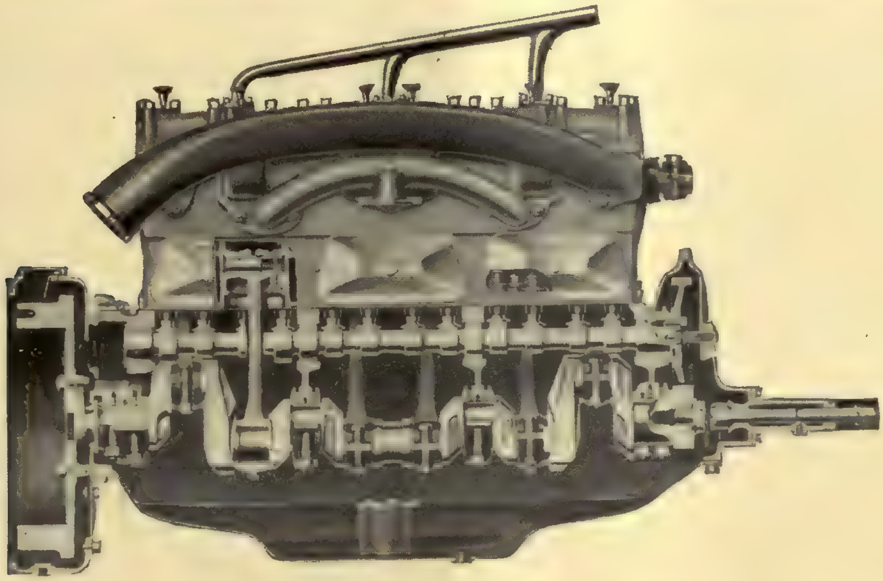
Hale and Kilburn SEATS



Standard Equipment

The RED SEAL Continental Motor, Model 6B

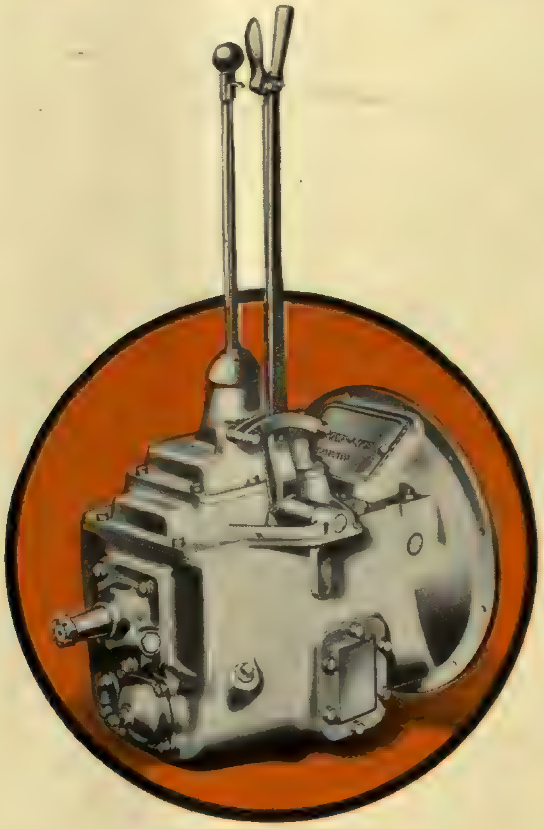
Longitudinal Sectional View

THE SIXWHEELER is new—but years of specialized experience are represented in the units that combine to make it an unparalleled achievement. It is powered, for instance, by the world-famous Red Seal Continental Motor, the motor that has helped to set increasingly high standards of efficiency in the automotive industry. Now, with its speed, its flexibility and its absolute dependability, the Continental Six Cylinder Bus Motor helps the SIXWHEELER to establish a new high standard of efficiency in bus transportation.

CONTINENTAL MOTORS

Powerful as the Nation

AMERICA'S STANDARD



Brown-Lipe Transmission and Clutch
represent the best that can be built

Past performances have earned for it
an enviable reputation for
dependability and stability

It is natural that Brown-Lipe
Transmission should be
selected for the "Six Wheeler."

Brown-Lipe Gear Company
Syracuse, New York

The Timken-Detroit Axle Company is glad to welcome, in the "Six Wheeler" of The Six Wheel Company, another new member of the motor-coach family.

THE TIMKEN-DETROIT
AXLE COMPANY
Detroit, Michigan

D T A
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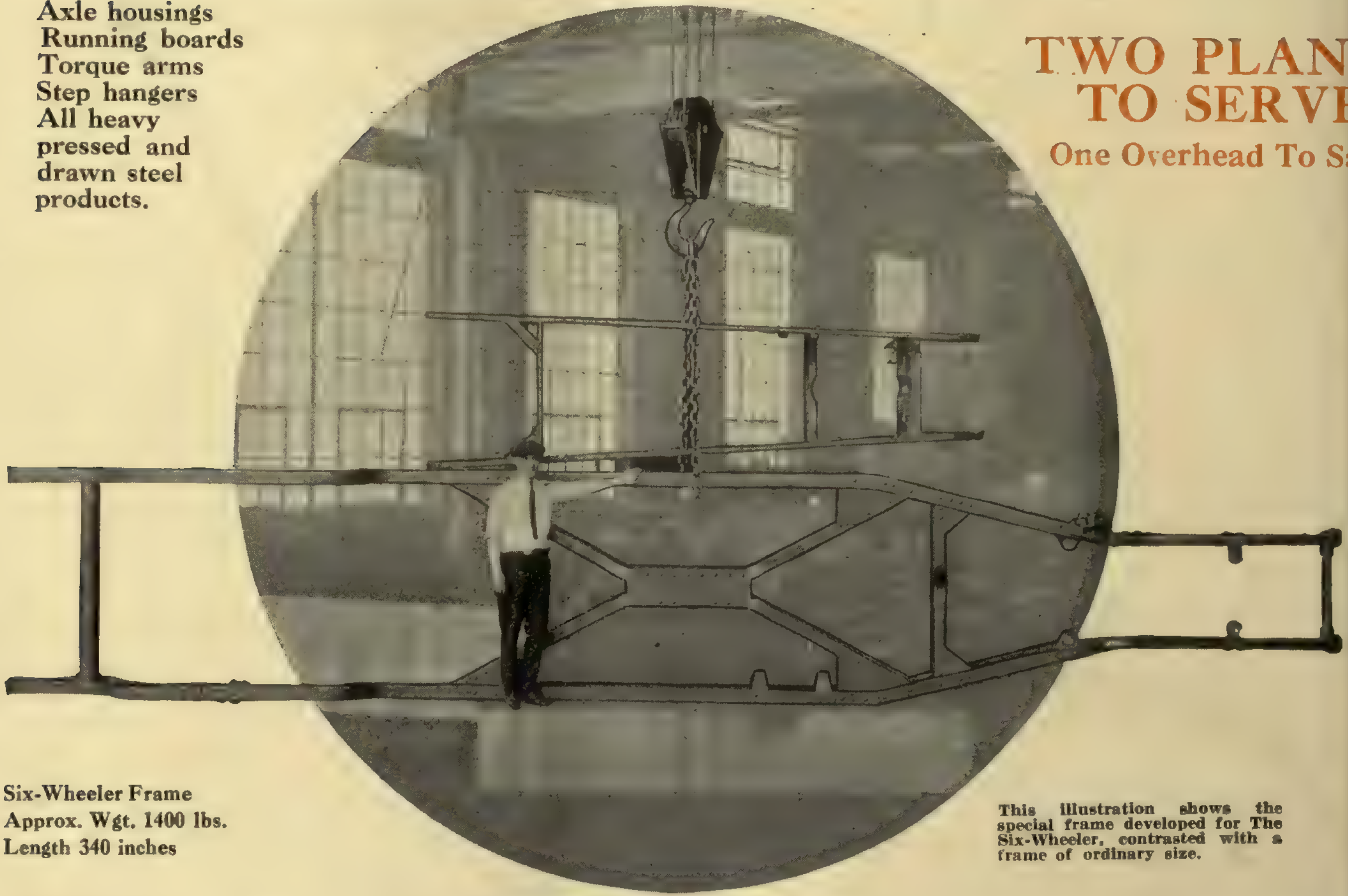
TIMKEN
AXLES

MIDLAND

The Largest Producer of Automotive Frames in the World

**Axle housings
Running boards
Torque arms
Step hangers
All heavy
pressed and
drawn steel
products.**

TWO PLANT
TO SERVE
One Overhead To Sa



**Six-Wheeler Frame
Approx. Wgt. 1400 lbs.
Length 340 inches**

This illustration shows the special frame developed for The Six-Wheeler, contrasted with a frame of ordinary size.

THE two plants of the Midland Steel Products Company are geographically situated for the greatest possible advantage to the automotive industry — Detroit Pressed Steel Division at Detroit and Parish & Bingham Division at Cleveland. No other automotove frame manufacturer offers this twofold, two-plant service.

The three apparent service-advantages are:

(1) Two reliable, immediate and adequate sources of frame supply;
(2) Lowest possible prices, based upon the large volume production, high purchasing power, low freights and low overhead;
(3) Economical, quick, short-haul deliveries, in many cases direct to plant via motor truck.

The equipment and tools of both plants are being made interchangeable to doubly insure unimpaired delivery.

Put your frame requirements up to the largest producer.

THE MIDLAND STEEL PRODUCTS CO.

Parish & Bingham Div.
Cleveland, O.

Detroit Pressed Steel Div.
Detroit, Mich.

Modine Radiators

Best for Bus Service. Naturally—
They're on the Sixwheeler

Modine Radiators are Sixwheeler Equipment for the same reasons that they have been the equipment of leading motor vehicles and automotive machinery for many years—

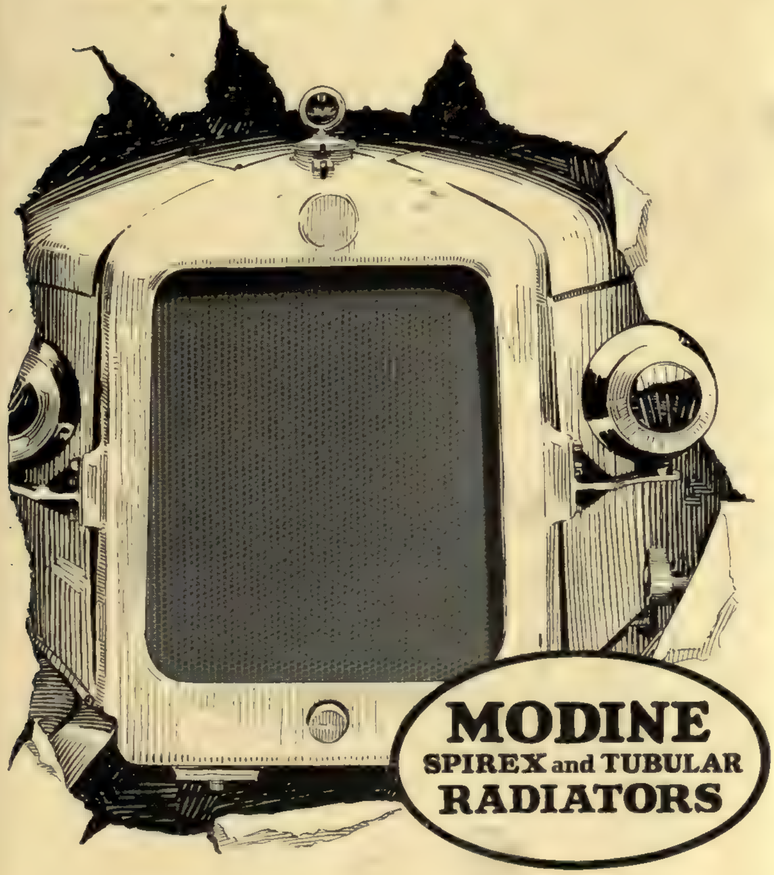
The Modine principle of air control maintains the coldest air against the hot walls of the water channels resulting in the greatest possible rate of heat dissipation.

Modine Radiators have greater cooling capacity per pound of core material than any other construction.

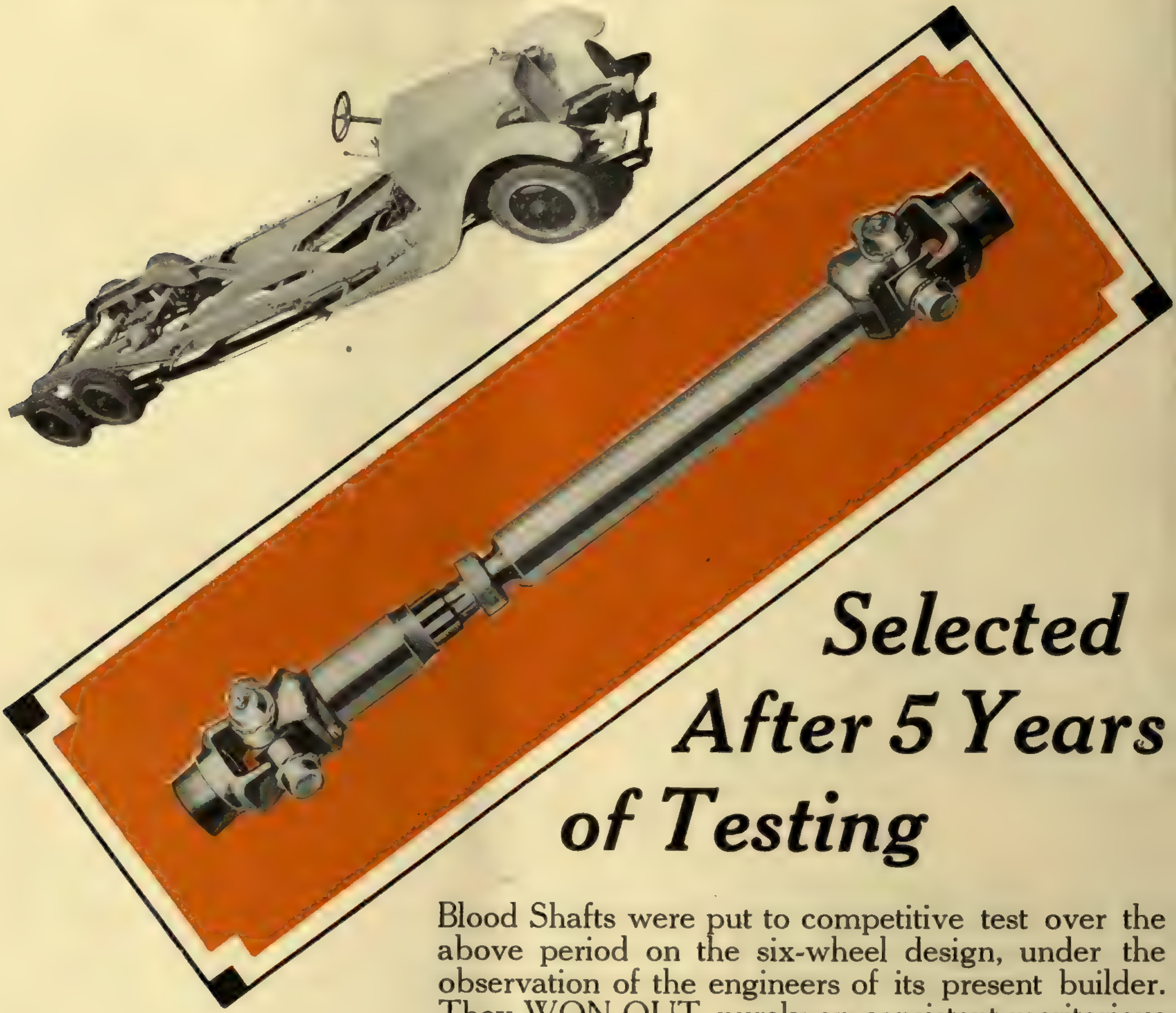
Extra large water channels—one-piece channel construction—extra heavy copper stock—3/16 inch solid metal face, are some of the factors for Modine's unequaled strength and durability.

Write for information.

Modine Manufacturing Co.
Racine, Wis.



Blood-Brothers Propeller Shafts



Selected After 5 Years of Testing

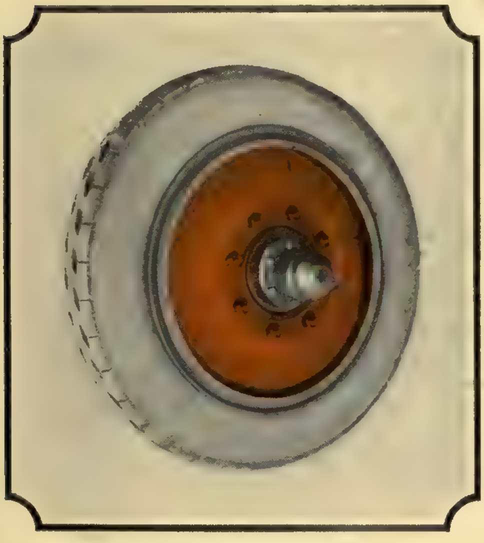
Blood Shafts were put to competitive test over the above period on the six-wheel design, under the observation of the engineers of its present builder. They WON OUT purely on consistent meritorious performance.

Blood-Brothers Shafts have earned their place on the "Six-Wheeler" because they ALONE have demonstrated ability to fulfill all requirements.

BLOOD-BROTHERS MACHINE CO.
ALLEGAN Pioneer Builders of Universal Joints MICHIGAN

BUDD WHEELS AGAIN!

for the SIXWHEELER



The SIXWHEELERS choice of Budd-Michelin disc wheels on which to ride in its initial scrutinizing journey of appraisal before the public brings out more pointedly the already established position of this wheel as the outstanding bus wheel of America.

Although standing in a new arrangement with respect to the chassis, it nevertheless is the same sturdy, dependable, quickly changeable Budd-Michelin, brother of the thousands which in past years have carried the bulk of bus travel. The Budd-Michelin wheel is the common denominator of the bus industry. A common coin of known worth, passing at face value on all highways and may be seen within the hour passing almost every crossroad in the country.

Seven identical interchangeable wheels to the bus, backed by seventy service stations scattered at important points over the country. The SIXWHEELER starts its life with a birthright heritage and claim to immediate and complete attention at any of these seventy points. The new bus is shod for any work future may demand.

Budd Wheel Company
Philadelphia, Pa.

BUDD WHEELS

Equip With the New Goodyear Pneumatic Cushion

Ideal equipment for you if you operate on cushion tires, is the new Goodyear Pneumatic Cushion Truck Tire.

This tire is an advance on even the celebrated Goodyear Cushion, known among bus owners everywhere for its wearing, cushioning and tractive qualities. There is nothing else like it on the market.

To the unequaled resilience provided by the Goodyear patented hollow-center design is now added the advantage of *a solid base*—also a Goodyear patent.

This rigid base makes the new Goodyear Pneumatic Cushion easier to apply. It holds the wheels with a wide, firm contact. It protects the entire tire and eliminates separation troubles.

This new Goodyear also has a higher profile, making a greater amount of rubber available for wear.

It has a wider All-Weather Tread, providing greater road contact, more traction, and greater operating economy.

The sharp-edged blocks of this famous tread are made smaller and more numerous in this tire, giving it still more gripping surface.

The sidewalls are made with the new Goodyear indented pattern for extra resilience.

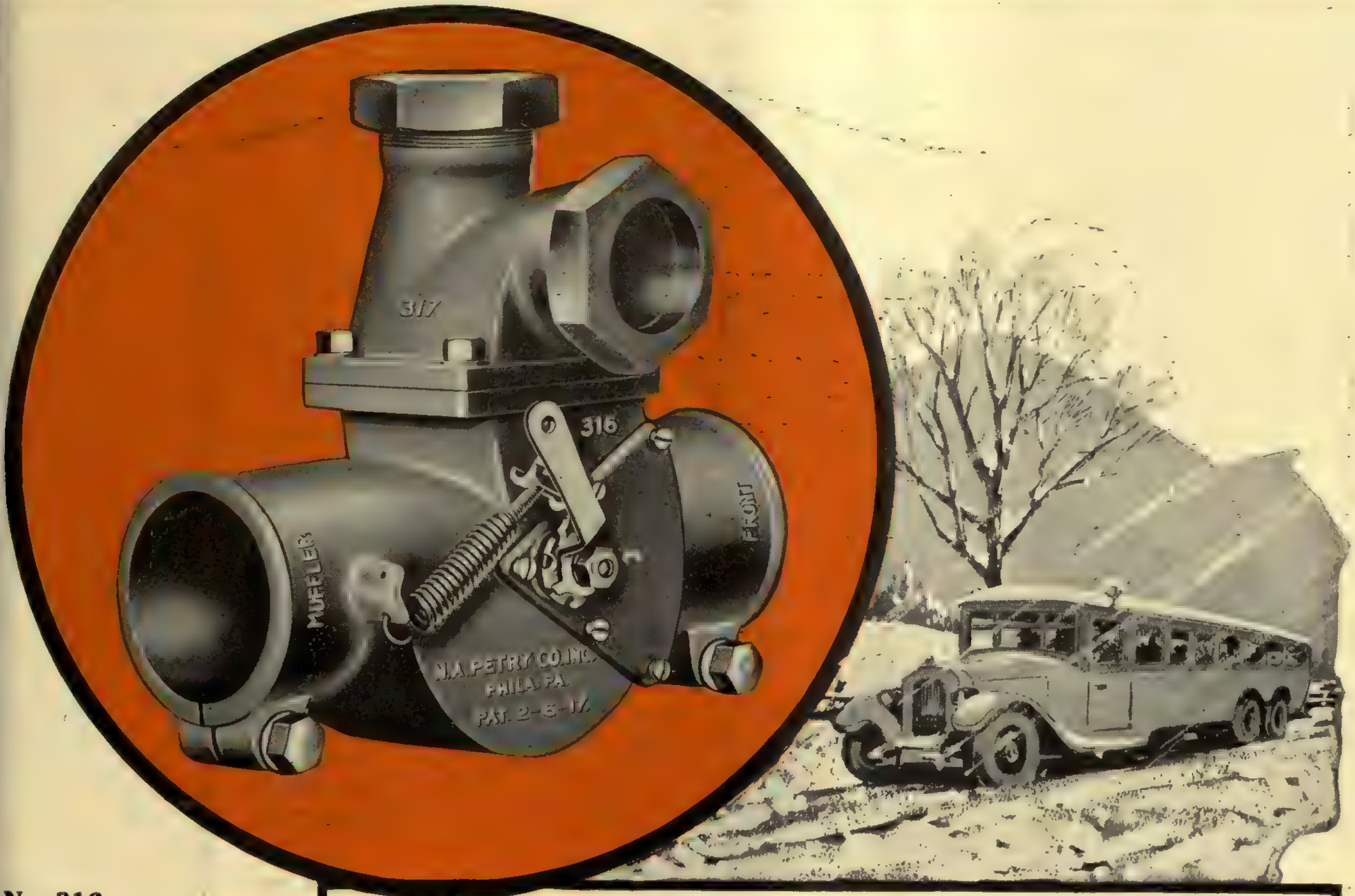
Give your bus operation the benefit of the cushioning, traction, and wearing strength built into this new and better Goodyear—the Goodyear Pneumatic Cushion Tire.

Goodyear Means Good Wear

GOODYEAR

Copyright 1924, by The Goodyear Tire & Rubber Co., Inc.

Goodyear makes the type of tire for every hauling condition—Cords, Pneumatic Cushions and Heavy Duty Cushions with the famous All-Weather Tread, and smooth-surfaced solids, also. Goodyear Truck Tire Service Station Dealers everywhere give standard Goodyear Service to bring out of the tires every mile built into them at the factory



No. 316
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on the
Six-Wheeler

PETRY HEATING Valve

The Heart of Successful

BUS HEATING

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The motor bus today is universally recognized as an established factor in passenger transportation.

Electric Railway Journal for nearly ten years has carried to its readers constructive information regarding the economic use of the bus and how it can be operated in conjunction with existing electric railway facilities. Today it is carrying this message to the officials of ninety-nine per cent of the electric railway companies in the United States and Canada.

Bus Transportation, since its inception, has made available the experiences of the most successful operations in the entire bus field. Building schedules, fare collection, public relations, design and maintenance of chassis and bodies, the formation of bus associations, the value of bus terminals—these and scores of other fundamentals of successful and profitable operation are discussed in a practical manner in every issue.

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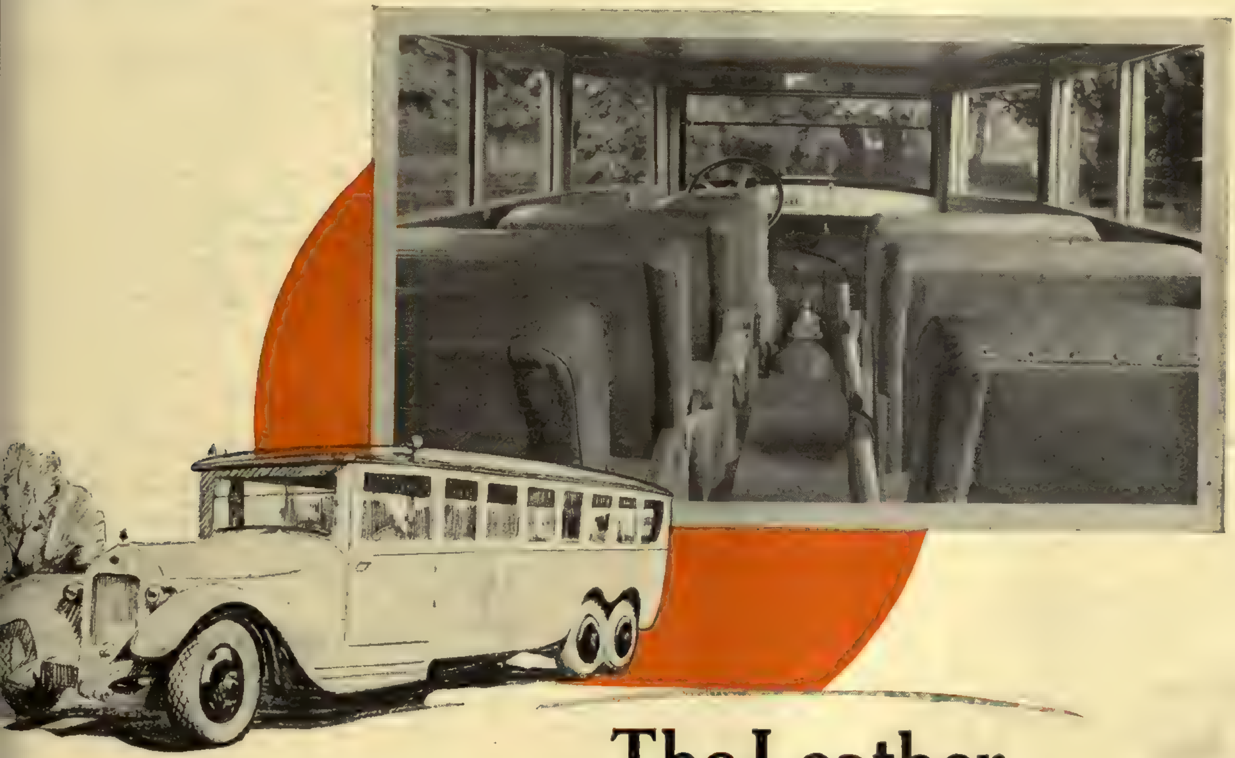

The Leather that Lasts the Longest

The Stengel family have been Tanners and Manufacturers of Upholstery Leather for over 100 years and are still at it, which is proof of their reliability.

The six-wheel models are upholstered throughout with George Stengel, Incorporated, Genuine Leather.

There is nothing that can take the place of LEATHER. It is durable, sanitary and retains its good appearance.

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for the SIXWHEELER

Selected for Reliability and uninterrupted service

In the choice of an ignition system for the SIX WHEELER, a careful study revealed that positive dependability ranked first in importance among the factors to be considered.

Ignition entirely independent of storage battery and lighting system was deemed advisable and the problem was narrowed to a test and appraisal of the various makes of high tension magnetos.

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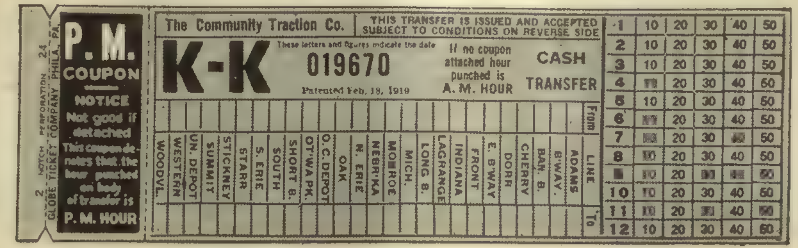

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4	▨	20	30	40	50
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6	▨	20	30	40	50
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8	10	20	30	40	50
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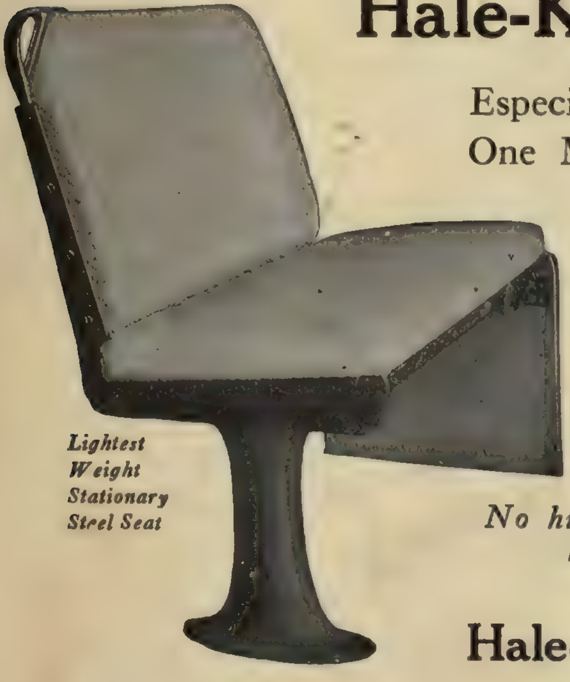

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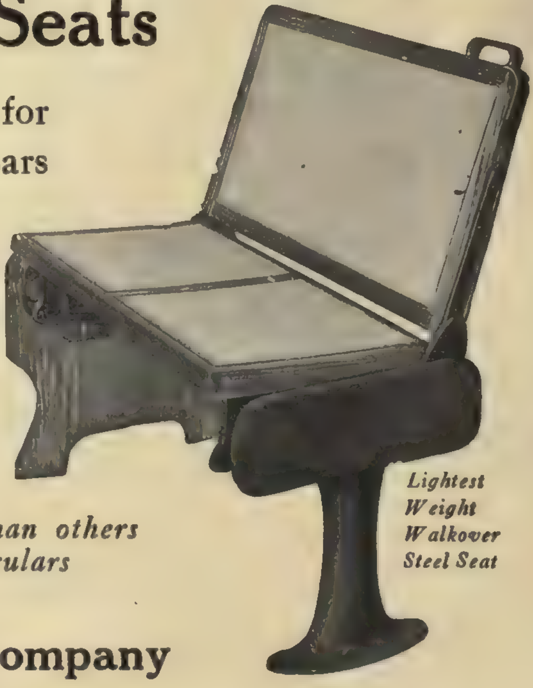

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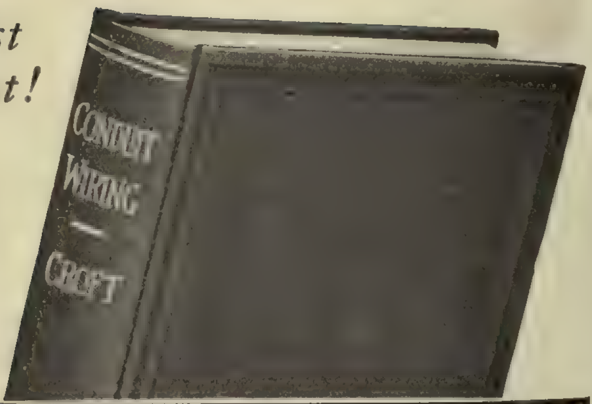

TERRELL CROFT has put into this book the complete story of wiring by the conduit method, the most important and most extensively used of all modern interior wiring methods. The steps and operations which must be followed in installing conduit wiring are discussed and explained so that wiremen with the aid of this book should be able to handle any conduit job, large or small, when given the plans and specifications.

Croft's

Conduit Wiring

By Terrell Croft

441 *pages*, 5½ *x* 8½, 700 *illustrations*, $3.00

This book explains how to install conduit wiring for all types of buildings, for all types of work. It covers the conduit wiring job from start to finish explaining each procedure, step by step, describing tools and materials and pointing out exactly what to do and how to do it, just what not to do and how to avoid it.

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SECTION HEADINGS

I.—How to Study This Book. II.—Conduit Wiring Materials and Supplies. III.—Laying Out a Conduit Job. IV.—Conduit Manipulation and Tools. V.—Installing Concealed Conduit. VI.—Installing Exposed Conduit. VII.—Installing the Conductors in the Conduit. VIII.—"Testing Out," Splicing and Taping Conduit Wiring. IX.—Grounding Conduit Systems. X.—Testing Conduit Wiring for Insulation and Continuity. XI.—Conduit for Telephone Circuits. XII.—Conduit Wiring in Damp and Otherwise Hazardous Places. XIII.—Conduit Wiring on Machinery.

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How to lay out a conduit system for a large building—for a small building—for a public service job. How to assemble tools and materials needed. How to determine what kind of conduit to use. How to measure conduit requirements. How to ream conduit. How to bend conduit. How and where to place outlets. How and where to handle exposed conduit—concealed conduit.

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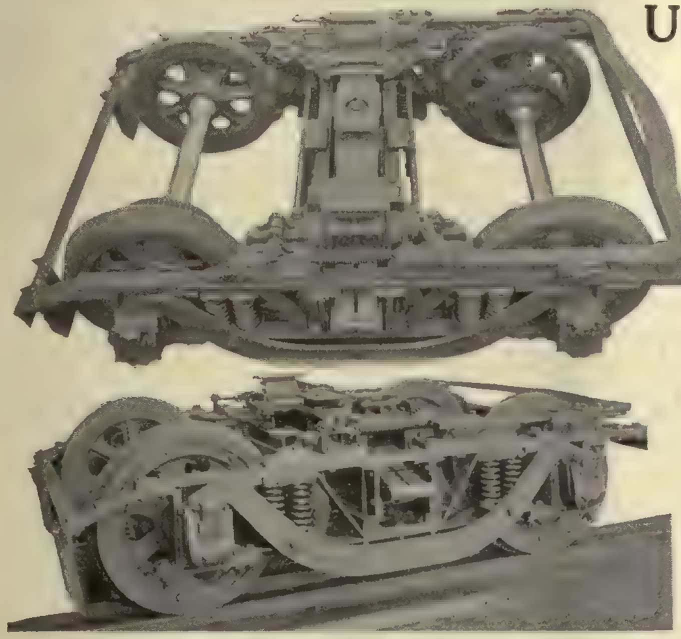
Kobe Himegi Electric Railway of Japan

Uses Baldwin Motor Trucks



Baldwin Motor Truck, Class "78-25-A" Wheel base, 78 inches.
Center Pin load, 25,000 pounds.

ON a number of the Electric Railways of Japan, Baldwin motor trucks have been in use for a number of years and have given the fullest satisfaction, meeting the most severe requirements.

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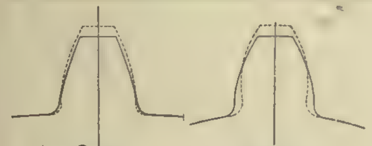
Helical Gearing



Dotted line shows tooth-form 4½° involute. Solid line shows tooth-form of Nuttall Helicals.

Rounded Teeth

For Serious Consideration By Your Engineers

Nuttall Helical Gears and Pinions mesh much like a big nut engages the threads of a screw. There is *no* shock, no vibration, and almost no wear. This lengthens equipment life.

The tooth form of Nuttall Helical Gears is scientifically correct. There is no undercut at the tooth root where the greatest strength is required. This is another item materially increasing the life of equipment.

Nuttall Helical Gear and Pinion teeth are rounded at the ends. This facilitates installation and eliminates some troubles which occur with flat ends, due to the sharp, hard edges chipping, or their tendency to cut. This seemingly small feature has saved much time and money.

We mention a few seemingly minor features to show you how deeply and thoroughly we go into every detail which will make gears and pinions better.

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Nuttall Pinion Blanks are specially drop forged by a process which practically equalizes the longitudinal and transverse ductility. Ordinary forged pinions are out of proportion in these characteristics in ratios as great as 2 to 1.

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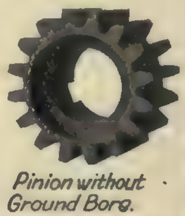
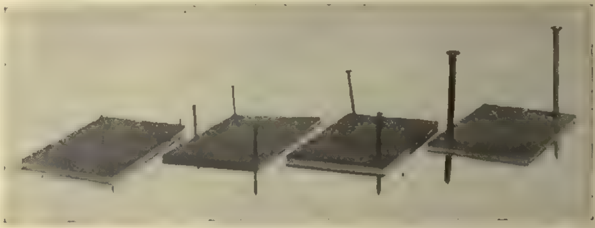
Pinion with Ground Bore



Pinion without Ground Bore.

These two tests and others you can make, show why prominent car builders and operating companies throughout the country have adopted Haskelite as the superior material for roofs, headlinings, and interior trim. Its use contributes stiffness and lightness to the structure and is most economical of labor and finishing materials.



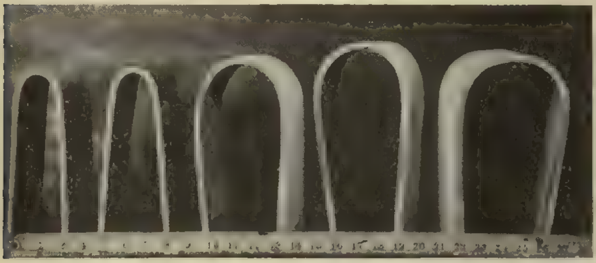
Note how HASKELITE resists splitting when nails are driven close to the edge. The very highest grade of waterproof glue holds the plies together as one piece.

Send for Samples of

HASKELITE

and make these tests yourself

HASKELITE can be boiled in water or oil, and bent to small radius curves. For roof panels and headlinings, it is moulded in steam-heated presses before shipping. The waterproof glue keeps the plies from separating under all conditions.



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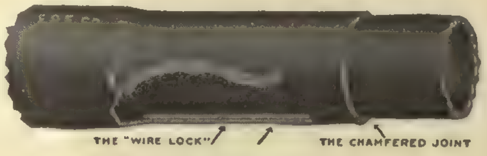

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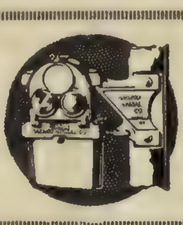

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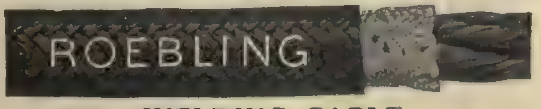

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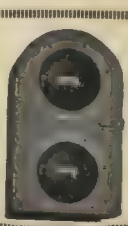

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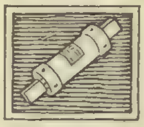
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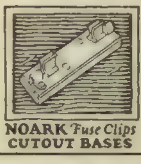
NOARK *Fuse Clips*
CUTOUT BASES

NOARK *Service and Underground Boxes*

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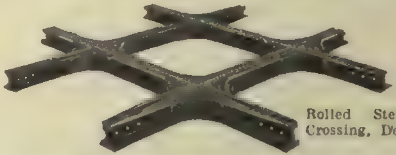
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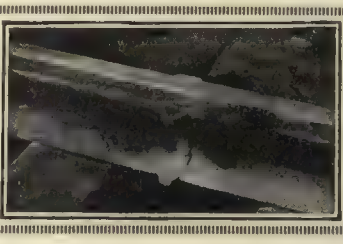

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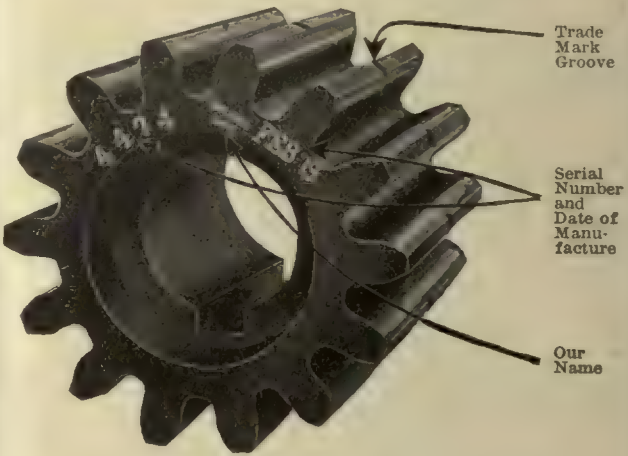

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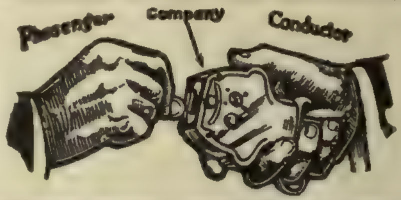

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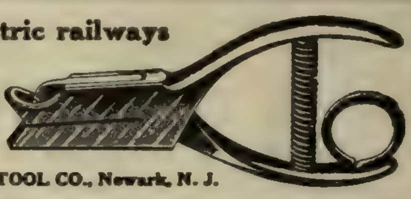
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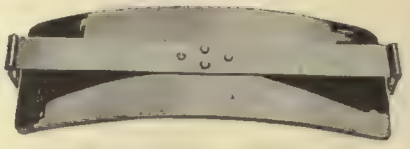

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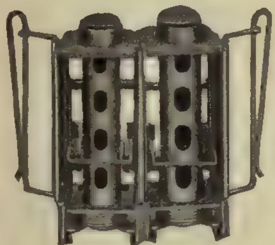

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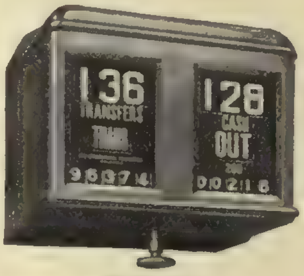

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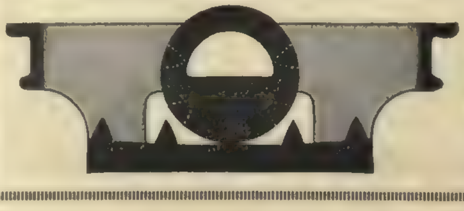

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Conveying Machinery
American Bridge Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
St Louis Car Co.
Westinghouse Tr. Br. Co.

Cranes
American Engineering Wks.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co
Transit Equipment Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
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Consolidated Car H't'g Co.
General Electric Co.
Hale-Kilburn Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Hale-Kilburn Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.

Electric Transmission Towers
American Bridge Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Engines, Gasoline
Continental Motors Corp.

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Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

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Ohmer Fare Register Co.

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Amer. Steel & Wire Co.

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Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Floodlights
Elec. Service Supplies Co.

Forgings
Brill Co., J. G., The
Standard Steel Works

Frames, Automotive
Midland Steel Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co

Furnaces, Electric Steel Melting
American Bridge Co.

Fuses and Fuse Boxes
Consolidated Car Heati'g Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Cartridge, Non-Refillable & High Voltage
Johns-Pratt Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

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Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

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Brill Co., J. G., The
Standard Steel Works

Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

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Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

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General Electric Co.

Generators
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General Electric Co.
Westinghouse E. & M. Co.

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Bethlehem Steel Co.
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Greases (See Lubricants)

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Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Bricks and Wheels
Railway Track-work Co.

Guard Rail Clamps
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Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson Mfg. Co., A.&J.M.
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

Heaters, Bus
Petry Co., Inc., N. A.

Heaters, Car (Electric)
Consolidated Car Heati'g Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

Helmets—Welding
Railway Track-work Co.

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Ingersoll-Rand Co.

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Hydraulic Machinery
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Oskel Equipment Co.

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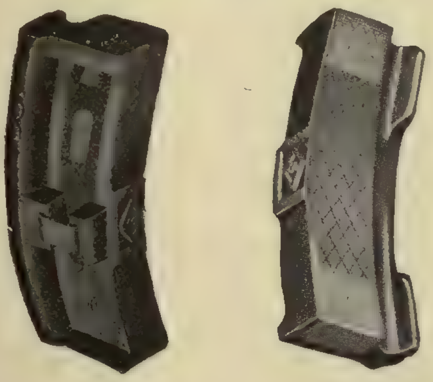

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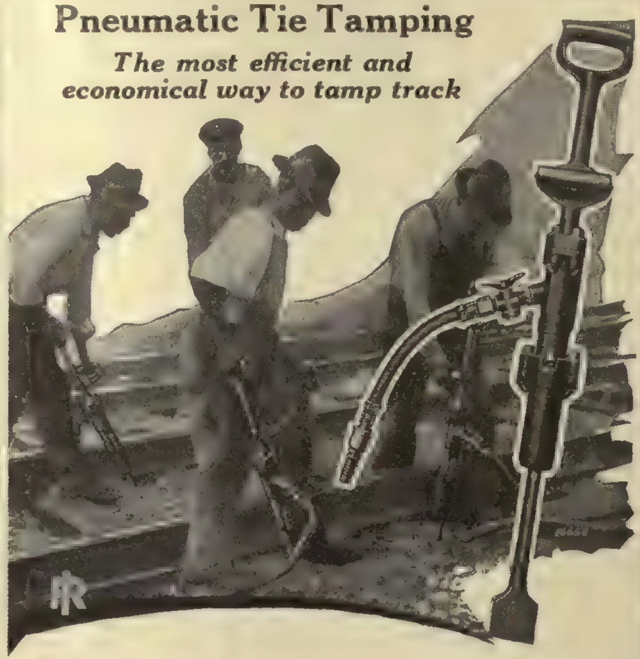

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Mitchell-Rand Mfg. Co.
Okonite Co.
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Irvington Varnish & Ins. Co.

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Elec. Service Supplies Co.
General Electric Co.
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Okonite Co.

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Ingersoll-Rand Co.

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Bonney-Vehslage Tool Co.
Intern'l Register Co., The
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Modine Mfg. Co.

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Carey Co., Philip

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Rail Joints
Carnegie Steel Co.

Rail Joints—Welded
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Foster Co., L. B.

Rails, Steel
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Carnegie Steel Co.
Foster Co., L. B.

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St. Louis Car Co.

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Hale-Kilburn Co.
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Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

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Heywood-Wakefield Co.
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Blood Brothers Machine

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Consolidated Car Heat. Co.
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Signal Systems, Block
Elec. Service Sup. Co.
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Morton Mfg. Co.

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Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

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Transmission
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Nuttall Co., R. D.
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Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

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General Electric Co.
Westinghouse E. & M. Co.

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More-Jones Brass & Metal Co.
Ohio Brass Co.

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More-Jones Brass & Metal Co.

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More-Jones Brass & Metal Co.

Trolley Wheels (See Wheels, Trolley)

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Amer. Steel & Wire Co.
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Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
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General Electric Co.
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Allis-Chalmers Mfg. Co.

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Perey Mfg. Co., Inc.

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Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

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Alumino-Thermic Corp.
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Ohio Brass Co.
Railway Track-work Co.

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Ohio Brass Co.
Railway Track-work Co.

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Elec. Ry. Improvement Co.
General Electric Co.
International Oxygen Co.
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Railway Track-work Co.
Westinghouse E. & M. Co.

Welding Steel
Elec. Ry. Improvement Co.
Railway Track-work Co.

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Wheel Presses (See Machine Tools)

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Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co.

Wheels, Car Steel & Steel Tire
American Steel Foundries
Standard Steel Works

Wheels, Steel Disc
Budd Wheel Co.

Wheels, Wrought Steel
Carnegie Steel Co.

Wheels, Trolley
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Roebling's Sons Co., J. A.

Wires and Cables
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Amer. Steel & Wire Co.
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Made of extra quality stock firmly braided and smoothly finished.
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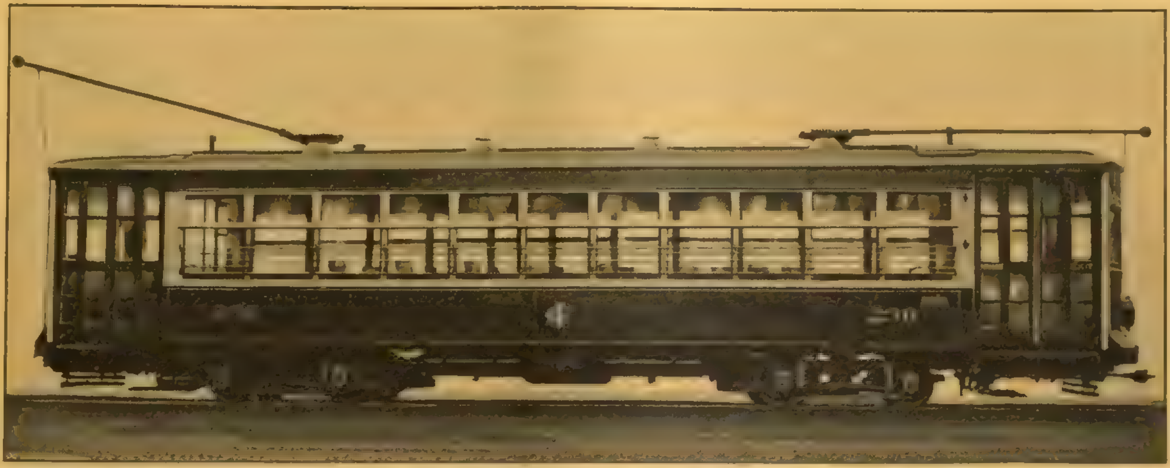

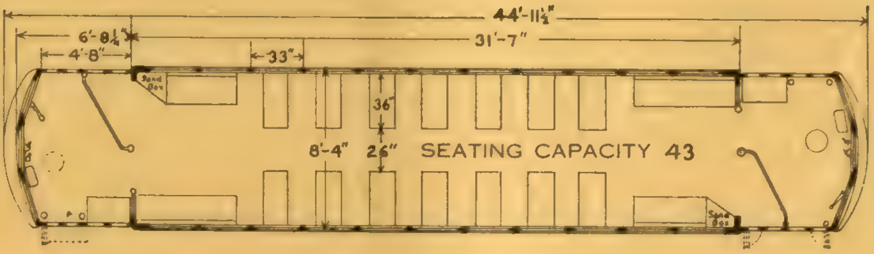

Chicago & Joliet Elec. Ry's latest cars of light weight and for one-man operation

In this type light-weight, double-end car, ten of which have been placed in service by the Chicago & Joliet Electric Railway, there is provided a spacious interior which is particularly attractive on lines having frequent passenger interchange. With longer post centers than possessed by other cars of its class, 36-in. seats and a 26-in. aisle, particular consideration was given to the convenient movement of passengers entering and leaving by way of the front platform.

As the pay-as-you-leave system of fare collection is used passengers leave by way of the door next the vestible corner post and enter through that next the body corner post. The single double-folding door at the rear is used for loading passengers only on special occasions.

These cars are mounted on Brill 39-E-1 single motor trucks.

THE J. G. BRILL COMPANY
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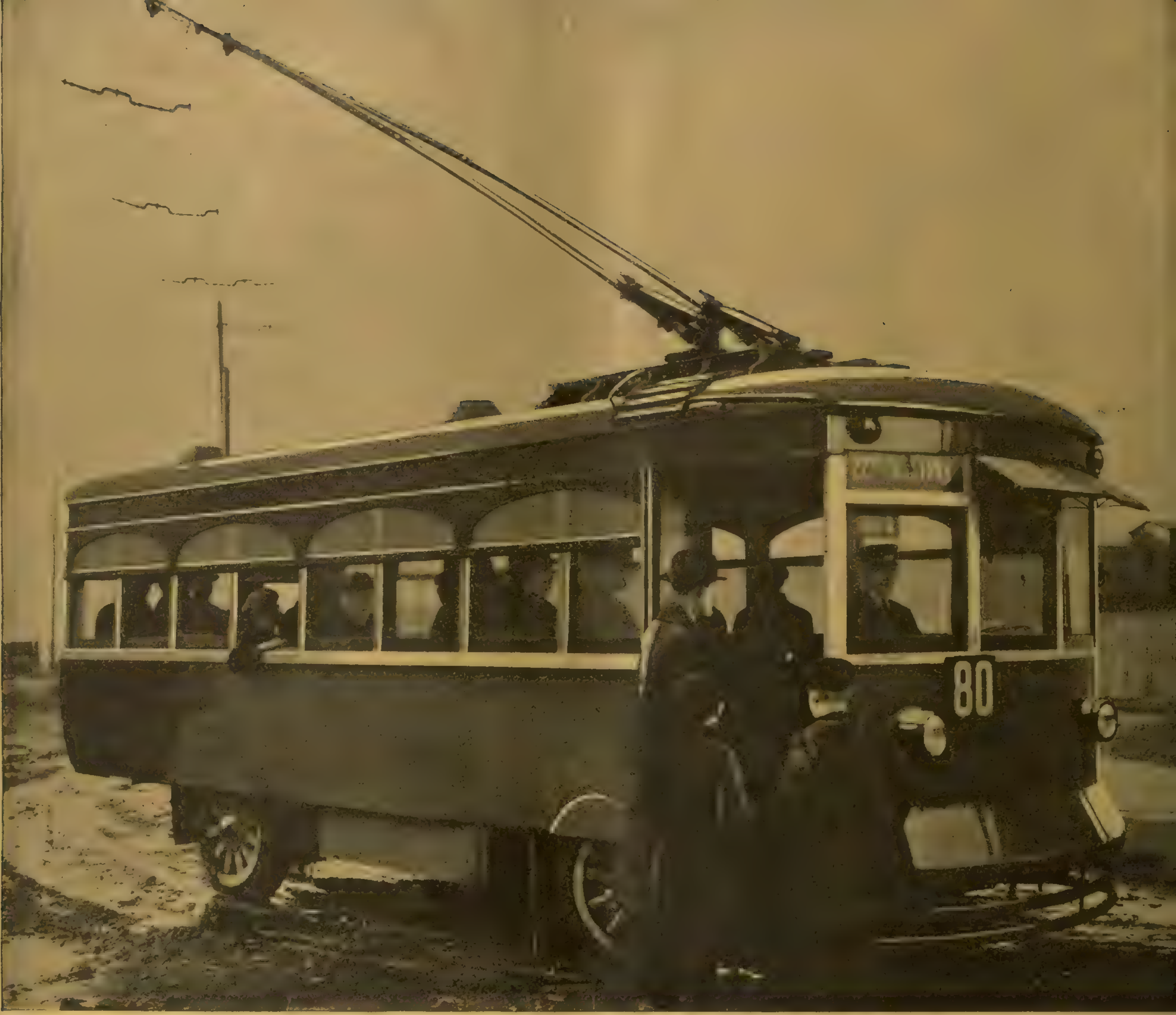
AMERICAN CAR CO. ST LOUIS MO. — G. C. KUHLMAN CAR CO. CLEVELAND, OHIO — WASON MANF'G CO. SPRINGFIELD MASS.



Brill trolley bus with GE-258 Motors and foot-operated M control.

Philadelphia also Believes in Buses

9 TROLLEY BUSES of this design, G-E equipped, are in regular operation on the Oregon Avenue Line of the Philadelphia Rapid Transit Company.

As an auxiliary to present service, the trolley bus offers an opportunity. Have *you* considered it?

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GENERAL ELECTRIC

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July 19, 1924

ELECTRIC RAILWAY JOURNAL

HOUSTON PUBLIC
LYCEUM AND CARNEGIE
HOUSTON, TEXAS

What is Your Basis of Depreciation for Track?

It has been defined as estimated loss in tangible physical property due to wear and tear not restored by proper maintenance, less the salvage value.

Rail renewals on over five miles of track in a metropolitan district on a Steel Tie-Concrete base have developed new and startling facts on the salvage value of a Steel Tie-Concrete track foundation. On this work it is running as high as 60 per cent of the initial cost.

The methods of renewal without disturbing the old base have the approval of leading track engineers and have been developed over a period of two years.

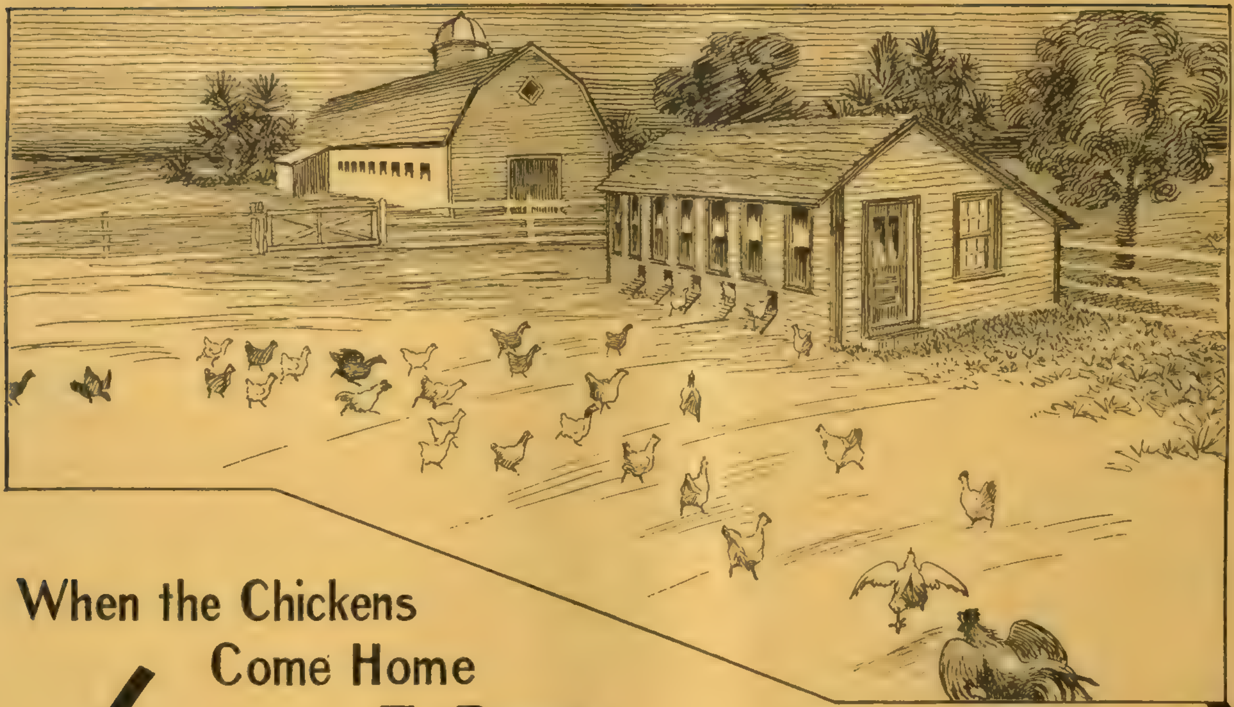
The new thought in paved track work is—"Put in the foundation to carry at least one rail renewal and cut the track charge per car mile from twenty to thirty per cent."

Ask for the details before proceeding with your mid-season construction work.

**The International Steel
Tie Company
Cleveland**

Steel Twin Tie Track

Economical Permanent Renewable



When the Chickens
Come Home
To Roost

Did you ever live on a farm? If so, you have noticed how the chickens wander away to neighboring fields in search of better food, but they always *"come home to roost."*

Some electric railway companies wander away from the recognized field of purchasing their renewal parts from the original manufacturer. But they, eventually, *"come home to roost."*

Why experiment and take chances?

The best is none too good. We have your prescription and can fill it as it should be filled.

Buy your renewal parts for Westinghouse equipment from us. We carry a large stock for you in our district warehouses.

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East Pittsburgh, Pennsylvania
Sales Offices in All Principal Cities of the
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W
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AMERICAN ELECTRIC RAILWAY ASSOCIATION
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Vol. 64 *No.* 3 New York, July 19, 1924 *Pages* 75-110

ELECTRIC RAILWAY JOURNAL

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The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

A Foreign Assignment

AS AN INDICATION of the standing of ELECTRIC RAILWAY JOURNAL in the industry which it serves, one of its editors has been chosen a member of a special committee of the American Electric Railway Association to visit Europe this summer and report on the practices across the water that merit special attention. The members of the committee sailed last week to be gone until the end of August. Undoubtedly they will find much that is good and that can be applied to advantage on our American roads.

The trip will, of course, cost a considerable amount, and a great deal of additional work on the part of the editorial staff is involved, but the publishers of this paper gladly consented to assist in the project because of the benefit that will accrue to the industry. And they would be less than human if they did not feel a sense of elation at the inclusion, almost as a matter of course, of a representative of the JOURNAL in the party engaged on such an important mission. This is not surprising, however. The JOURNAL is a paper with a world-wide circulation and is considered as highly on the banks of the Po and the Rhône as in the United States and Canada.

Number of Copies Printed, 7,075

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Good service demands good joints

"The practice in Milwaukee is to keep joints in such condition as to avoid complaints due to rough riding or pounding."

* * *

"In Toronto a cupped receiving rail is given early attention."

* * *

These two examples of good practice in rail joint maintenance are quoted from the "Journal's" recent survey of rail joint maintenance methods. Every week multiplies evidence to point the economy of prompt welding and grinding.

Delay means letting the defect lead to opening up the pavement—and you know what that costs.

Economy lies in owning effective welders and grinders—and keeping them busy.

The equipment is illustrated here.

It is described in our bulletins.

You may not have read the latest editions. Write for a set.

Railway Trackwork Co.

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Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
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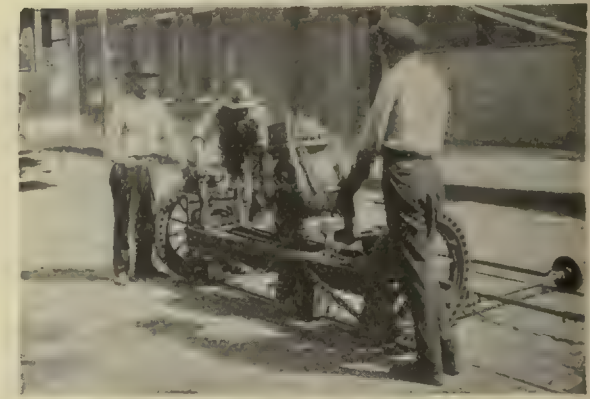
(247)

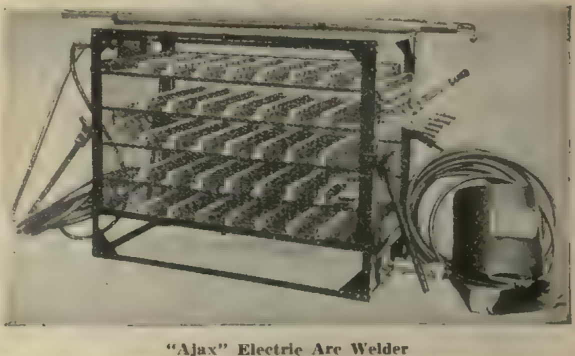
"Reciprocating" Track Grinder



"Universal" Rotary Track Grinder

"Atlas" Rail Grinder

"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder

LAA
Luminous Arc

Two Popular Imperial Interurban Types

These two popular Imperial Headlights for interurban service are standards for maximum illumination.

The LAA Luminous Arc throws a high-powered beam, illuminating the track for a sufficient distance for safe stopping of cars traveling sixty miles an hour. It operates efficiently on a wide voltage range.

The DCP Incandescent, for lines with constant voltage, is comparable to the arc for illumination.

Full specifications in Headlight Catalog No. 210.
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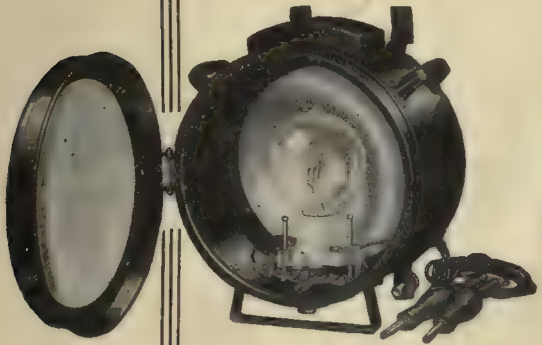

DCP
Incandescent

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS

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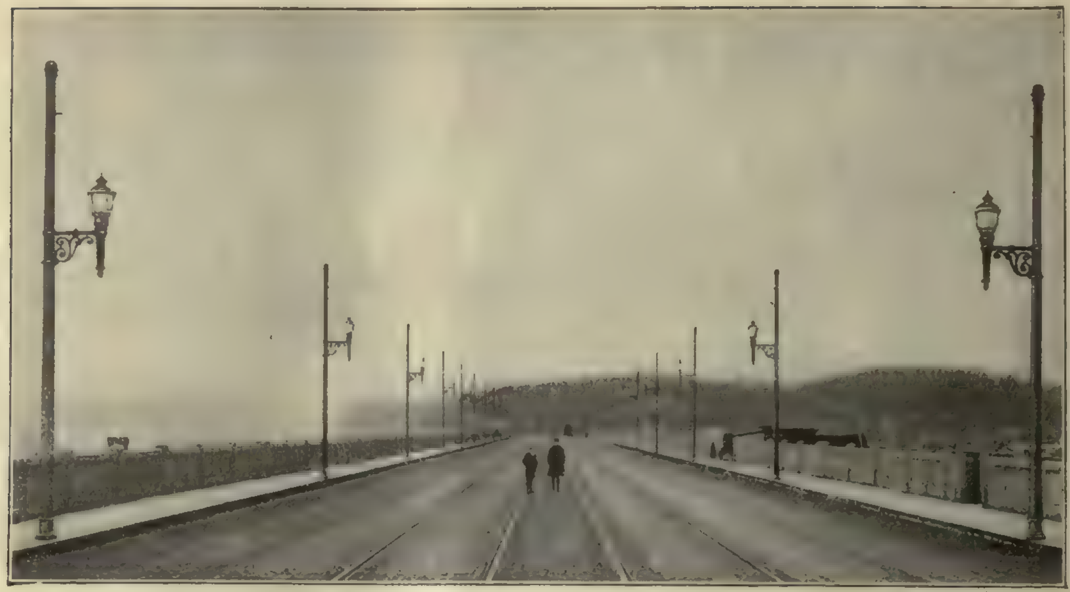


ELRECO Combination Railway and Lighting Poles on the Hopple Street Viaduct, Cincinnati, O.
Over 27,000 ELRECO Poles are in use in this city

One Set of Poles Takes Care of Light and Traction

Here you have a good illustration of the economy of ELRECO Combination Railway and Lighting Poles. As can be seen, they are doing double duty—supporting the trolley span-wires and lighting brackets. They can also be utilized for carrying high tension and secondary wires.

This plan has been used to advantage in many cities. For the street railway company it saves half the investment in span-wire poles, since the lighting company shares the use of these poles with the traction company.

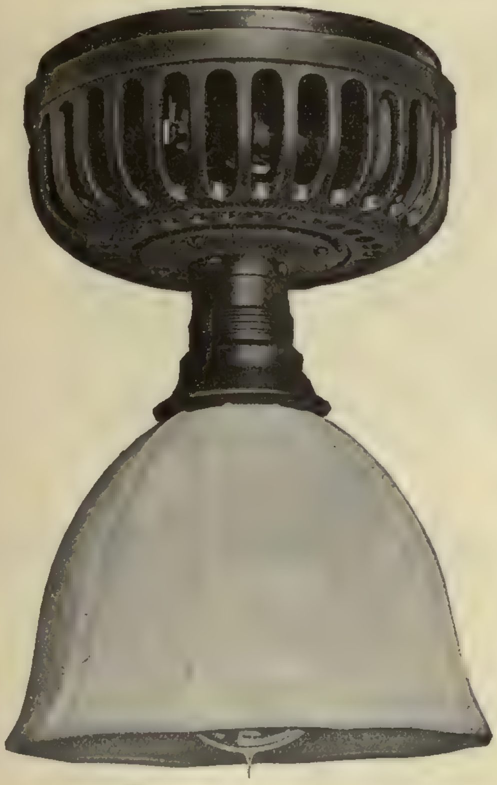
Tubular steel poles are the strongest made and are capable of sustaining strains in any direction. Especially valuable at corners where pull-offs tie in at various angles. Easiest to paint. Cheapest to maintain. Our wire lock swedge joint prevents telescoping. Chamfered joints prevent corrosion.

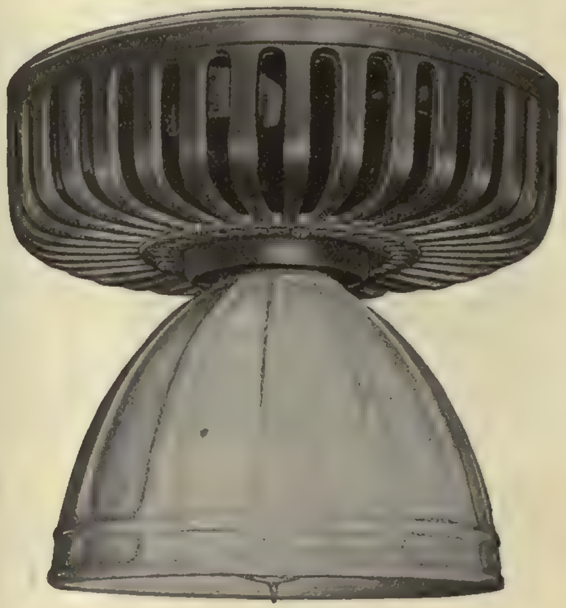
An investigation of ELRECO Poles will clearly demonstrate that they are the only poles a street railway company should consider.

The Electric Railway Equipment Co.
Cincinnati, Ohio
New York Office: 30 Church Street

ELRECO
POLES

KEYSTONE
Compensating Fixtures





Keystone Compensating Fixtures are but one of hundreds of car equipment specialties bearing the Keystone trade mark. Like all other specialties these fixtures have been thoroughly tried out in service before being introduced by the E.S.S.Co. organization.

The burning-out of any lamp in a series car lighting system will not affect the burning of the remaining lamps when Keystone Compensating Fixtures are used.

The advantages of one or two circuits using these fixtures as compared with several circuits of small lamps, are as follows:—

Greatly reduced cost of lamp renewals.
Greatly lessened loss of lamps from theft.
Immediate evidence of burned-out lamp.
Vastily improved appearance and lessened glare.
Greatly simplified car wiring.
Better illumination for a given total wattage consumption.

This fixture consists of an ornamental fire-proof canopy in which is contained the necessary number of enameled resistance units to represent the equivalent capacity and resistance of one incandescent lamp. The resistance is normally out of the circuit, but the removal, breaking, or burning-out of a lamp automatically connects the resistance in series and thus the continuity and normal resistance of the circuit is maintained.

The growing tendency toward the operation of high candle power incandescent headlights in series with one or more circuits of car lamps and also the increasing use of larger units in car lighting has made a device of this character practically a necessity.

Write us about your particular problems

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

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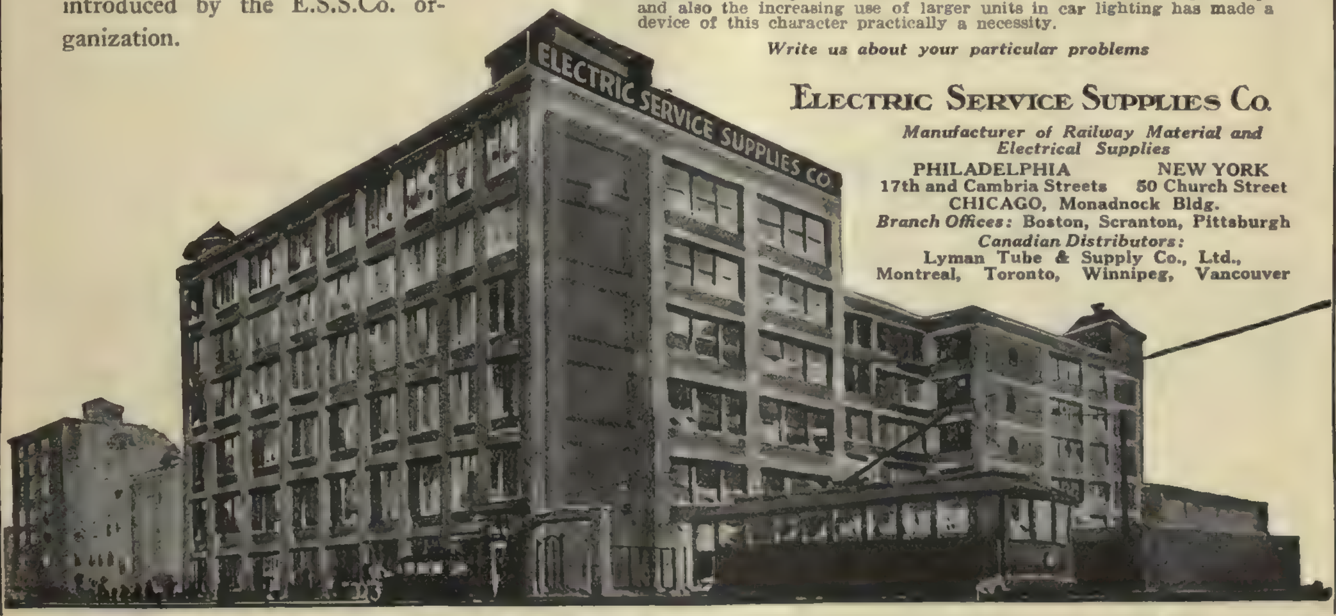

A Giant Organization at Your Service

Every year hundreds of thousands of Western Red Cedar and Northern White Cedar Poles are shipped from our vast holdings in the North and Northwest to our big concentrating yards and treating plants. On the butt of every pole is a stamp which identifies it as having been selected and inspected and passed as of National Pole quality.

The National Pole Company maintains four treating plants, at strategic locations. These plants are among the largest and most efficient pole treating plants in America.

After the poles are treated they are branded with the year and the National Pole Company's name. And back of this brand mark stands this company, the largest distributors of cedar poles in the world, with a service unapproachable in the entire cedar pole industry.

NPCO

This stamp on the butt of every pole identifies and guarantees it as National Pole quality.

NATIONAL POLE COMPANY

Escanaba, Michigan

Western Electric Company

Incorporated

Offices in 47 principal cities.

Co-operation

in every new development

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In each case, National Pneumatic Company experts have been consulted, used, and trusted in the design and development of these cars. Their experience, knowledge, and judgment is available for you, with no obligation involved. Call upon them for consultation in your car door problems.

National Pneumatic Co., Inc.

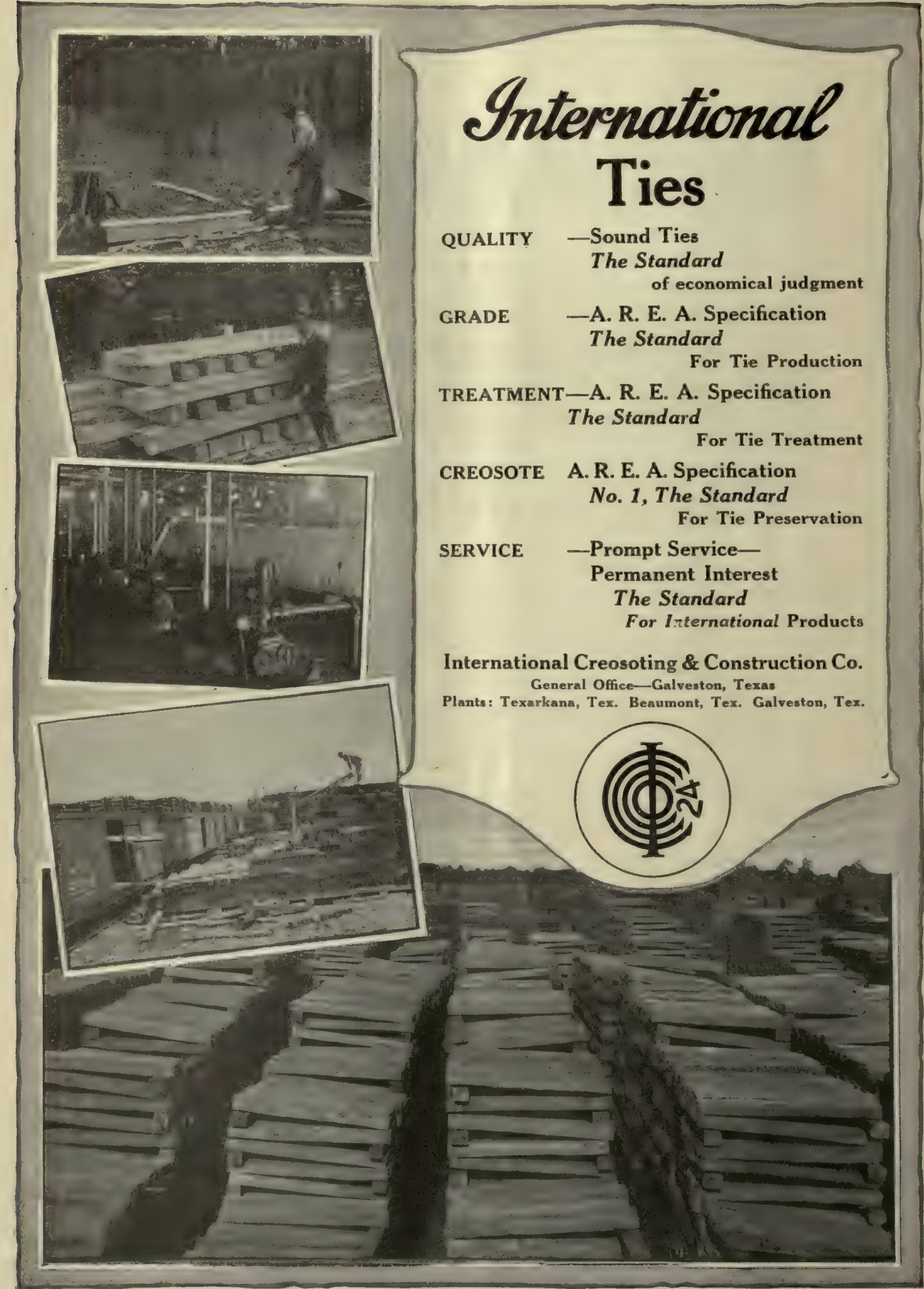
Originators and Manufacturers

Principal Office: **50 Church Street, New York**

Philadelphia—Colonial Trust Building Chicago—McCormick Building

Works—Rahway, New Jersey

Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.



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Ties

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CREOSOTE	A. R. E. A. Specification *No. 1, The Standard* For Tie Preservation
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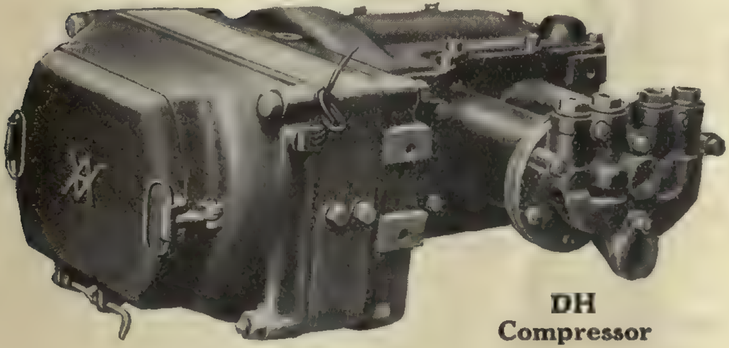
International Creosoting & Construction Co.
General Office—Galveston, Texas
Plants: Texarkana, Tex. Beaumont, Tex. Galveston, Tex.

IN SAN DIEGO

Fifty new light-weight, high-speed interurban cars of the type illustrated here have been placed in service on the recently completed San Diego-La Jolla line of the San Diego Electric Railway Co. These cars are equipped with Westinghouse AMU Brakes and Westinghouse DH-25 Air Compressors.

DH COMPRESSORS

You can apply Westinghouse DH Air Compressors to your cars with complete assurance that you are definitely settling the air compressor problem for many years to come. Satisfactory service under every condition; dependability coupled with durability; positive lubrication; compact, low-height design—these features have made the DH Compressor the favorite everywhere among railway operating men. Built in three sizes, 10, 16 and 25 cu.ft. piston displacement.



DH Compressor

COMPLETE
AIR BRAKE
EQUIPMENT
for EVERY CLASS
of
SERVICE

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES

Waterloo, Cedar Falls & Northern Railway Co., Waterloo, Ia.
"Cedar Valley Road"

Office of Superintendent and Traffic Manager
Maurice A. Welsh, Superintendent and Traffic Manager:

"Our Mack buses have been highly satisfactory from every standpoint — appearance, riding qualities, tire mileage, gasoline consumption, absence of engine trouble and ability to maintain schedules."

Letter of Apr. 20, 1923

------- in the interest of more profitable service–

THE experience of the Chicago North Shore & Milwaukee Railroad is typical of what follows when the hand that holds the controller is linked to the hand that holds the wheel.

In the bus, railways are finding a flexible revenue-producing type of service—a service that meshes with operating and cost problems that only the bus can satisfy.

But buses differ, just as other types of equipment. The *principle* of bus operation by railways is sound. The choice of the right make of bus is the thing that safeguards investment.

From chassis to roof covering the Mack is 100 per cent bus design—planned to meet the special conditions found in service.

The Mack bus chassis was designed and is built especially to ensure *frame rigidity*. Frame is built as close to the ground as possible without sacrificing road clearance; a passenger convenience and a big factor in minimizing side-sway on sharp turns.

Motor is higher pressure oil system type. Counter-balanced case hardened crank shaft. Lighter reciprocating parts.

Long springs, light but strong, float in beds of solid rubber cushions, compressed in steel brackets. Road shocks are absorbed before they reach the frame.

Front axle is wide; a safety measure and a real factor in turning the long wheelbase. Dual reduction rear axle is strictly a bus axle; designed to give maximum clearance to ground and overhead; dual reduction; straight line shaft eases universals.

Over-geared or direct transmission optional.

Thus, point by point, Mack bus engineers have worked out every detail contributing to the peculiar requirements of bus service.

The Mack bus is *all bus.*

INTERNATIONAL MOTOR CO.
25 Broadway New York City
Builders of City and Sedan Type Buses

The 85 Branches owned by this company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK INTERNATIONAL MOTOR TRUCK CORPORATION."

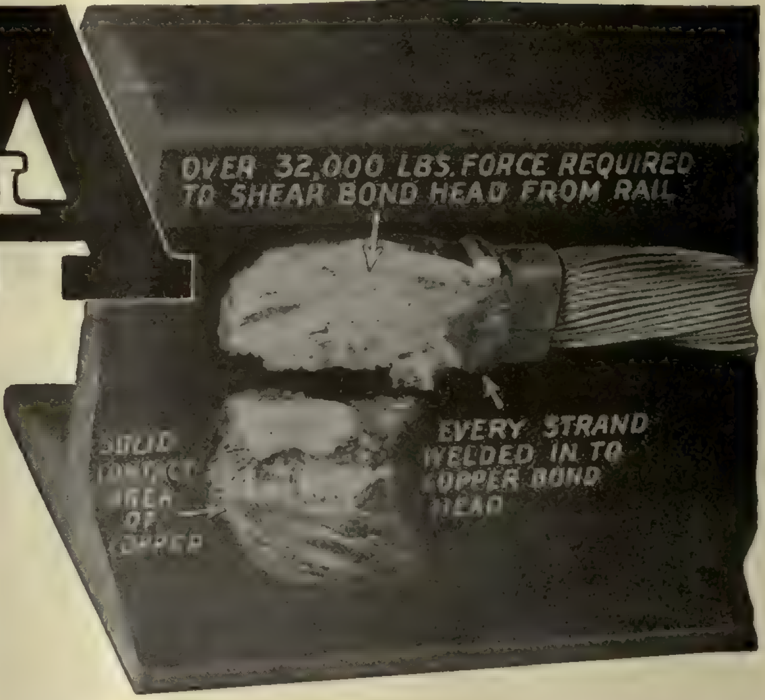
The Mack Bus

25 passenger, City Type

RE-ORDERS of Mack buses by the "Cedar Valley Road" in the year since Mr. Welsh's letter was written speak even more eloquently of their belief in Mack performance.

Performance counts!

UNA RAIL BONDS


OVER 32,000 LBS. FORCE REQUIRED TO SHEAR BOND HEAD FROM RAIL
EVERY STRAND WELDED IN TO COPPER BOND HEAD
SOLID CONTACT AREA OF COPPER

The photograph shows a UNA Bond head removed from the rail by applying a direct shear of 32,000 lbs. Note that the shear took place through the bond head leaving the weld of copper to steel intact—note the large area of contact of the copper-steel weld, also how each strand of the bond is welded into the bond head.

You can't go wrong on that weld!

That's what a welder said after welding a few UNA Bond heads by the UNA Process. Why? Because he could actually see the copper welding to the steel rail. He knew that he was getting a good weld. There was no guess-work about it.

The UNA Process of bonding is simple, almost automatic. Clean the rail with a wire brush but save the expense of grinding. With the bond head in the mold, place the mold against the rail. Strike an arc with the UNA-Metal electrode. As the metal deposits in the mold wash it against the bond head and the rail by a slight forward and backward motion of the electrode. When the mold is full the job is finished.

Not only is the bond securely welded to the rail but each strand of copper in the bond is welded into the head. As the mold fills up, each strand becomes a part of the weld. That means that every strand carries its share of the current so that maximum bonding efficiency is secured.

UNA-Metal, the electrode used makes the weld to the rail positive. It cleans the rail of rust and scale, leaving a clean steel surface to which the molten copper welds.

About 35 seconds of actual welding time applies a 4/0 bond head. That means a large number of bonds a day. It keeps down your "Cost per applied Bond."

UNA Bonds provide a continuous path of all-copper from rail to rail—that's a real copper bond with 100% bonding insurance.

Send for copy of Bulletin No. 108. It contains detailed operating instructions covering the installation of various types of UNA Bonds

Rail Welding and Bonding Co.
Cleveland, Ohio

UNA RAIL JOINTS

Right!

even in the little things!

Take brake adjustment, for instance!

Quick, easily accessible brake adjustment is one of the outstanding features of Fifth Avenue Buses.

When a driver finds that brakes are not holding as they should, he doesn't call the garage, or pull-in the bus. He doesn't even need a single tool. The turnbuckle adjustment on the outside, takes up brakes with a twist of the wrist.

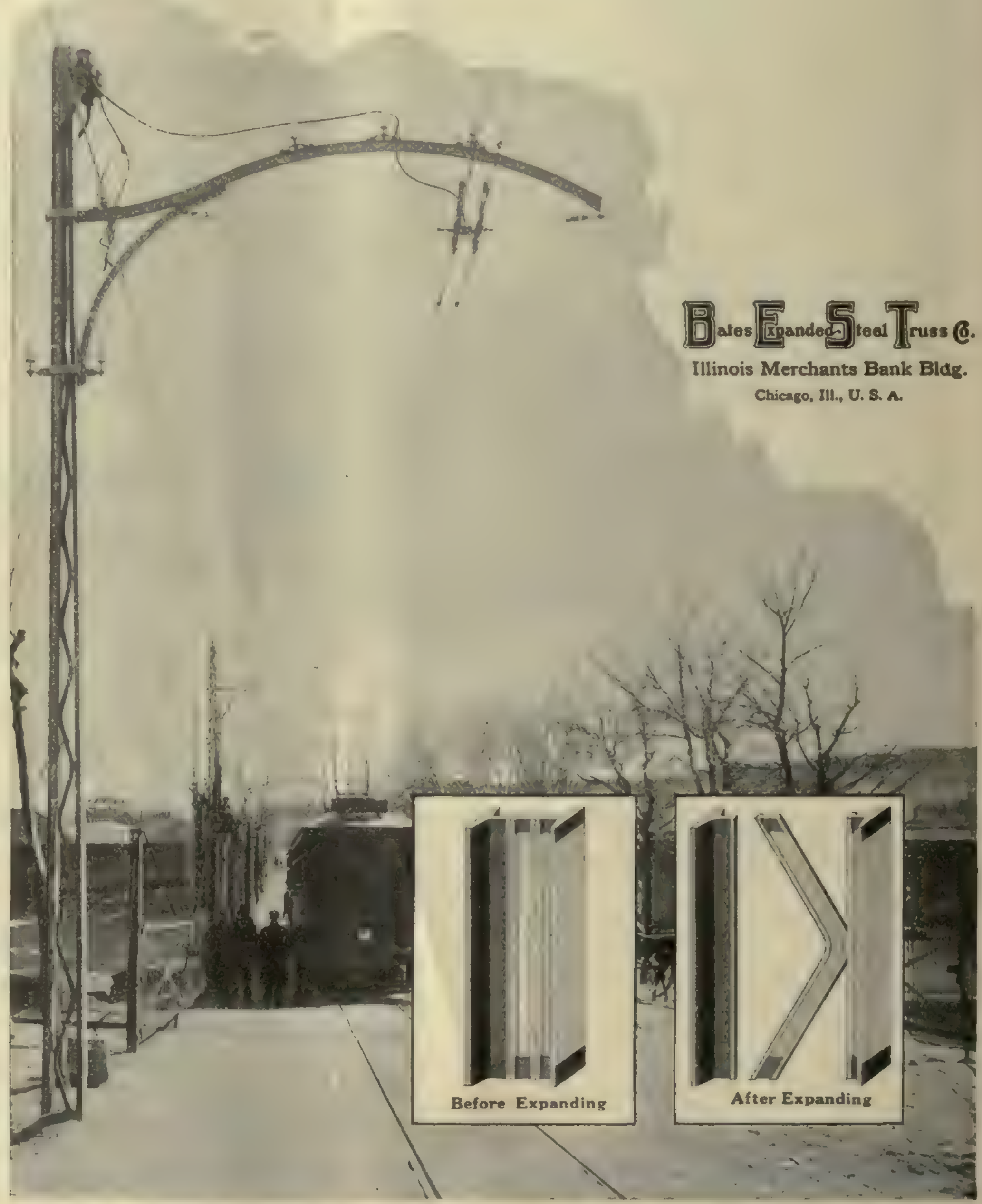
Simplicity, efficiency, durability are factors which Fifth Avenue operating experience alone, can build into every bus for every service.

NEW YORK TRANSPORTATION CO.
New York, N.Y.

Bates Poles on Electric Railway in Coruna, Spain

Bates Poles with specially designed trolley supports are used along the right of way of the Compania de Travias de la Coruna at Coruna, Spain.

A perfect truss made from one piece of steel, without rivets bolts or wheels, Bates Poles have remarkable strength and give sturdy service. Mass production makes them economical in first cost, their simplicity makes them easy of maintenance.



Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
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BATES ONE PIECE EXPANDED STEEL POLES

Knowing how

It's just as important that pitmen be trained to the proper handling and use of lubricants, as it is that the motorman be trained in proper handling of the car.

Galena Service was developed to perform this important and necessary function. When you become a Galena customer an experienced Lubrication Service Engineer is assigned to your road. As much of his time as may be needed to supervise your lubrication is allotted. He instructs your employees and assists in installing the oils and methods best suited for your operating requirements.

Then the result of "knowing how" shows up in the maintenance costs.

Galena Service goes with the contract for Galena Lubricants.

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

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A Complete Service

For years the General Electric Company has encouraged high standards for railway apparatus and supplies. It has persistently emphasized the wisdom of maintaining good equipment with supply parts equally as good. It has spared no effort in guiding electric railways in the selection of modern equipment; in giving helpful suggestions on proper operation and maintenance; and in facilitating maintenance by supplying duplicate parts to perpetuate the quality built originally into equipment—a complete, permanent service to the industry.

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GENERAL ELECTRIC

New York, Saturday, July 19, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 64
Number 3

Careful Maintenance Insures Good Electric Car Lighting

CAR lighting usually is a matter of little concern to the management of an electric railway or even to the equipment superintendent. Ordinarily in the design of the car a number of outlets are provided sufficient to give what is supposed to be adequate illumination with the correct size of lamps, and nothing further is done except to replace the lamps when they burn out.

But car illumination is much more than merely replacing lamps as a matter of routine maintenance, as is seen from the article by E. E. Dorting in this week's issue. His study of causes of failures shows that by far the greater number are due to breakage of the filament. While this is to be expected on account of the severe shocks incident to railway service, the average life obtained in subway service is 1,644 hours, against a guarantee of 1,500.

A feature of this study that is of vital importance is that it pays to discard lamps after their illuminating power has been reduced a certain amount. This is, of course, on the assumption that production of light is what the lamps are installed for. Far too often the lamps are allowed to burn to the point of mechanical failure, even though the filament has broken and been welded together a number of times, with a corresponding reduction in illumination, or else the bulb has blackened so that only a fraction of the light can get through. By keeping the illuminating value of the lamps up to standard, a smaller number is needed to produce the desired result.

Illumination is the purpose for which lamps are installed. It has a great value in the merchandising of transportation. So the progressive railway should see to it that the lamps are properly maintained, since, as the author states, "Light, not lamps, determines the economy of car lighting."

Continued Study of Rail Corrugation Will Bring Results

AS A RESULT of years of effort, the medical profession has finally accomplished the almost complete elimination of the once dreaded typhoid fever. The successful outcome of this tedious struggle might well serve as an inspiration for electric railway engineers who are growing weary of some of their problems. One such problem that has been studied for many years and still remains a long way from solution is rail corrugation. Not a few way engineers have voiced the opinion that it is a waste of time to study this subject any more, because previous investigations have not got very far. That is not a very courageous attitude, however. The harder the nut to crack, the greater the achievement of him who does it.

A worth-while contribution to the study of this question is made in this issue by I. E. Church, who has made extensive investigations of rail corrugation on the Pittsburgh Railways. The evidence in this case points to there being an important relation between tightness of gage and corrugation of rail. Some interesting observations concerning the effect of rigidity or flexibility in the structure are also made. Of course there is nothing very novel in these conclusions. But it is not the novel theory that usually turns out to be right. Rather it is the theory which has been tested again and again, and confirmed.

It appears to be quite generally believed now that rail corrugation is the result of any one or a combination of several different causes. Among these are wheel slippage on curves, condition of the rolling stock, irregularities in gage and nature of the track structure. Not all electric railway engineers agree on the relative importance of these different factors, nor do they agree concerning the effects produced by each. But the more we can learn from authoritative sources concerning actual conditions and results in various places, the further we are advanced along the road to an ultimate solution.

Putting Car Lubrication on a Higher Level

THE day is passing when oil for use about an electric railway may be stored in any dark corner where odds and ends of equipment of various sorts are tossed, and where sand or sawdust must be thrown on the floor to soak up the slopped oil. The use of any shed or lean-to for the storage of oils, where there is only a part of a floor, and where rain can flood the place has been found an expensive adjunct. Then, too, the use of an old leaky coffee pot or a tin can for measuring and issuing lubricants has likewise gone into the discard.

Alert mechanical men now realize the importance of having the oil house carefully arranged and know that economy in oil should start at that point. The survey on storage and handling of oils, published elsewhere in this issue of the ELECTRIC RAILWAY JOURNAL, shows that 60 per cent of the electric railway shops included have provided oil storage facilities equipped with modern storage tanks. These oil houses provide places for the immediate transfer of the oils to proper storage tanks as soon as they are delivered. These

This is the issue in July that is devoted essentially to maintenance subjects

tanks can be kept clean and painted at intervals. In general they are plainly labeled to show their contents. The use of measuring pumps for the issue of oil has stopped slopping and waste, as well as mistakes in the amounts drawn off. Concrete floors fitted with drains assist in the work of keeping all the parts clean.

The storage of greases which are too heavy to flow with any degree of rapidity without excessive heating must be in the shipping containers. In general, lubricants of this nature can best be handled by using a clean paddle or spoon, or in cold weather a knife, to remove the necessary quantities to fill smaller containers which can be carried to the parts to be lubricated. For the protection of greases stored in barrels or drums a special removable cover can be used, which will reduce the danger of getting dirt into the interior.

How much of this changed attitude on the part of railway shop men is due to the stand taken by the fire insurance men against carelessness in the handling of inflammable materials it is hard to say. Certainly this factor has been one that has played a great part in the improvement of conditions. Apart from any reduction of insurance premiums, the regulations which now apply are worth all they cost in saving of lubricants and in better lubrication.

Of course, the men engaged in the work of oiling have a dirty job. The improvement in working conditions that has come from the better storage and handling methods tends to attract a better class of men. The importance of the work is being recognized by shop managements, and those men assigned to the work are being chosen accordingly.

All these things are steps forward and should lead to gratifying results. There are, however, some railways that have not yet learned the lesson. If an analysis of lubricating troubles and high oil costs on such properties is made, undoubtedly it will show the importance of cleanliness, and through it a considerable reduction in the cost of lubricants and an increase in their lubricating value by keeping foreign material out.

Study Your Shop Organization

THE most efficient shops are those where the men are kept busy continuously doing the particular class of work to which they are best suited. If a high-class mechanic has to leave his work to assist in moving some heavy piece of equipment, or if he is required to go to the storeroom to obtain some needed material, he not only is doing work which a lower paid employee could do just as well, but his work is interrupted, which reduces his efficiency and in many cases an overcrowded machine tool is allowed to stand idle. The greatest production and efficiency in a railway shop results only when sufficient auxiliary mechanical equipment is provided so that each shopman is kept at work steadily.

Electric railway shops encounter many conditions that make it hard to maintain an efficient working organization. Most roads require all of the rolling stock that they can put on the streets for their morning and evening rush service. Cars due for inspection are thus not placed in the shop until late in the morning and they must be released in time for the evening rush hour. Also, cars that are being overhauled must be put through the shop and returned to service promptly. It requires a considerable amount of serious effort on the part of foremen so to organize their work that men are kept busy who work in the inspection and overhauling of cars. Also on small properties workmen must be shifted from one job to another, since there is an insufficient amount of work of any particular type to keep a man busy continuously.

Efficiency under conditions such as these requires planning and laying out of work ahead, or else the men will be forced to loaf though they may have no inclination to do so.

In these days, when much attention is being paid to modernization, railway managers are giving increased attention to unit costs for repairs. The loss in man-hours is one that requires close attention if it is to be overcome. But it is an item that must receive close study if low repair costs are to be secured.

Material-Handling Devices an Essential Part of Shop Equipment

THAT it is necessary to have efficient material-handling equipment if the greatest efficiency is to be obtained from the shop machinery is well known to all electric railway executives. Nevertheless there are many electric railway shops which are badly lacking in material-handling devices. A notable example of this was disclosed in a recent survey made by the editors of the ELECTRIC RAILWAY JOURNAL on machine tool equipment. Two electric railway shops had recently purchased modern wheel lathes identical in every respect. Yet one railway was obtaining nearly twice the output from its wheel lathe that the other obtained.

An analysis of the reason for this discrepancy in production showed that it was due entirely to the difference in facilities for getting the wheels into and out of the lathe. The railway shop which was handling its wheels most efficiently had two additional tracks installed for moving the wheels to and away from the lathe and had provided modern jib cranes for handling the wheels. In the other shop it had been attempted to use the devices and arrangements which were installed before the purchase of the new lathe, but which were improperly located for the most efficient handling of material. The men operating the two lathes were equal in efficiency at turning the wheels after they were once in position, but the inadequate facilities of the one shop not only reduced the total efficiency of the man while he was working, but he was also led away from the lathe and from his work so that there was a loss of time.

This comparison indicates that a survey of the present material-handling equipment in the shop of any electric railway is desirable, if for nothing more than to determine if the best methods are in use. In many cases such a survey should produce beneficial results and increase production. The installation of new, up-to-date machinery is but one link in the chain of shop efficiency. An increased rate of output from a machine without adequate equipment for handling the material will not give the desired production. Using skilled and high-priced labor for work which should be done by material-handling equipment is expensive. Lower costs and increased production quite likely will result from a careful study of the conditions in nearly any shop.

Oil Storage and Handling Practice

Information Obtained from 57 Electric Railways Shows that Careful Storage of Lubricants Eliminates Waste, Prevents Contamination, Minimizes Fire Hazard and Facilitates Keeping of Records—Increased Use of Buses by Railways Makes Necessary Storage of Gasoline in Quantity

PROPER storage of the various oils used by electric railways is of vital importance on account of the fire hazard involved, which is also reflected in the insurance rate. To determine current practice a survey was conducted by the ELECTRIC RAILWAY JOURNAL covering the storage, handling and reclamation of lubricants, as well as the storage of gasoline, turpentine, alcohol and paint oils. The information was obtained in connection with the survey of lubricating methods of 57 electric railways published in the May 17 issue of this paper.

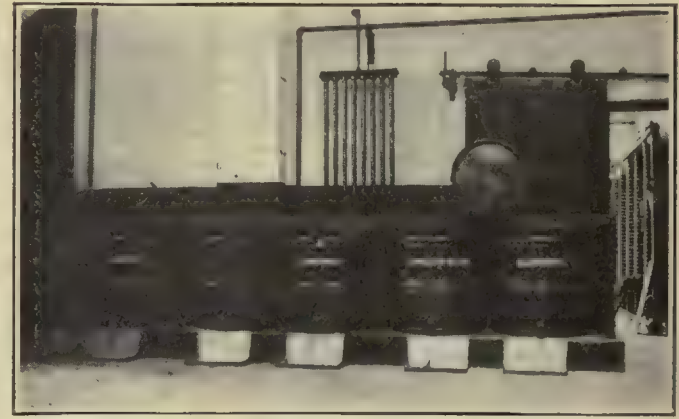
Aside from the fire hazard which accompanies the storage of any lubricant, it is necessary to provide adequate storage and handling facilities in order to insure cleanliness. The most perfect lubricant will fall short of its intended purpose and cause trouble if stored or handled in such a manner as to become contaminated. A dry, fireproof structure or at least a special room set apart for lubricants is a primary requirement. In addition, where the expense is justified, storage tanks with self-measuring pumps, heating coils and adequate equipment for installing and handling the drums and shipping containers should be provided. Such an oil storage may appear somewhat costly, and consequently certain railways which are close to oil supply depots have set aside small sections of the storeroom or carhouse for the storage of lubricants. Usually the oils are kept in the shipping containers in which they are received from the dealer.

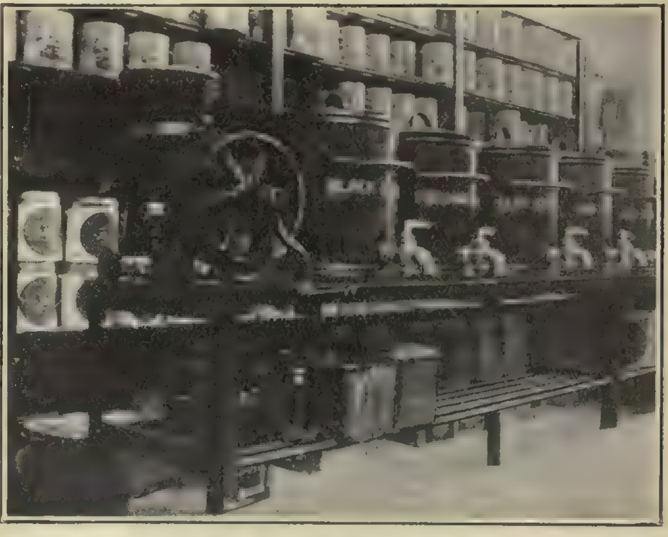
OIL HOUSES SHOULD BE FIREPROOF

Where an oil house is warranted, it should whenever possible be of fireproof construction throughout. Brick, tile or concrete walls and floors, a tile, metal or slate roof, or a ceiling built on to steel beams or rafters are standard. The floor should be fitted with drains, and every provision taken to insure easy cleaning. Most railways are using comparatively small buildings for oil storage purposes. Information was obtained as to the size of buildings and rooms used for storage and is shown in tabulated form in the accompanying table. The space reported varies from a minimum of 32 sq.ft. to a maximum of 5,000 sq.ft. A total of 21,245 sq.ft. was reported by 35 companies operating 15,438 cars. This is an average of 1.38 sq.ft. of storage space per car.

The Manual of the American Electric Railway Engineering Association contains a design of oil house for use of railway companies operating from 100 to 150 cars. The size of the oil house given in this design is 14 ft. x 21 ft. in size. This is a space of from 2 to 3 sq.ft. per car. Six companies owning 180 to 103 total cars and 144 to 85 passenger cars give dimensions of oil storage houses that average 2.33 sq.ft. per car for all cars and 2.94 sq.ft. per car for passenger cars only. This corresponds very closely with the space recommended by the A.E.R.E.A.

Information received from the railways in this survey indicates that in general a fireproof construction similar to that given in the Engineering Manual is being used. The separate oil houses reported are made of cement or brick with cement floors. Some railways have underground tank storage, particularly where such inflammable forms of oil as gasoline or paint oils are stored.





Three Views in Paint and Oil Storage House of New York Central Railroad at Harmon, N. Y.

Oil House of Washington, Baltimore & Annapolis Electric Railroad at Naval Academy Junction

As to the various methods of storage in the oil house, 24 railways state that they use oil storage tanks, 10 additional railways use both tanks and drums for the storage of their lubricants, and 23 railways store their lubricants entirely in barrels or drums. In any railway the type, number and size of storage tanks that should be installed will depend upon the volume and nature of the lubricants to be stored. Some roads prefer to keep all tankage below the floor level. This enables the main floor to be used for receiving and delivering lubricants. This area can be devoted to delivery pumps and other necessary accessories. On small properties where the quantities used are small, it may be advisable in the interests of economy to keep lubricants in the shipping containers during the entire period of storage rather than to plan to transfer them to tanks.

ADEQUATE FILLING AND MEASURING FACILITIES A PAYING INVESTMENT

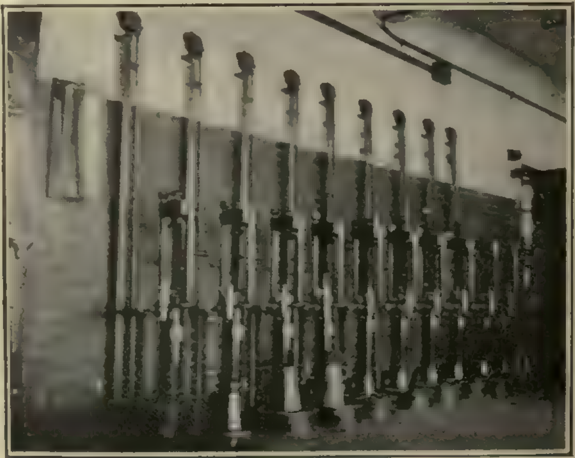
From the results that have been obtained it is evident that adequate containers, filling devices and provisions for measuring the lubricant as it is given out, as by means of self-measuring pumps, are paying investments since much waste of oil is eliminated, time is saved and the fire hazards are reduced. With modern equipment, records of quantities received and supplied are more easily kept and measurements are more reliable. Improved equipment also adds considerably to the morale of the working force by improving the appearance of the oil house and giving the oiler some pride in his job.

FACTORS TO BE CONSIDERED IN OIL HOUSE DESIGN

There are several factors that should be considered in the design of an oil storage house. These include (1) the type of building construction and materials entering into the oil house or oil room; (2) the storage tanks and accessory equipment necessary, such as heating coils, etc.; (3) the necessary material handling equipment for the efficient transfer of lubricating products and their shipping containers; (4) satisfactory equipment for measuring oils in order that a suitable record can be kept; (5) provisions in the arrangement of the equipment desirable where oils are to be distributed to various departments or to several shops; (6) the extent to which semi-solid lubricants are used by the railway, and (7) the method of keeping records and managing the oil house for efficient operation.

The value of orderly oil-house operation and properly kept records of daily, weekly and monthly oil consumption cannot be overestimated. The effect on the morale of the shop employees and the economies in the consumption of lubricant that can be obtained will be surprising, when employees must follow a definite procedure in obtaining their necessary oil supplies, with an accurate record kept of their consumption. Information obtained in the survey included some details of the oiling organization of different railways and the various systems used for recording and keeping track of withdrawals. Most railways have men definitely assigned to the oiling work, as by this method the men become more expert in packing the various bearings and their care, and understand better the necessity for keeping the oil clean and the bearings properly lubricated. Some foremen have found it advantageous to tabulate various detailed lubricating data. These records displayed in the carhouse for the information of the oilers enable them to locate a particular motor or compressor which is using more oil than the average. An investigation can then be made to determine the cause and so prevent serious trouble.

The storage and general supply of lubricants usually is handled by the storage department. Of the 57 railways included in this survey, 51 gave definite infor-



At Left—Oil House and Saturation Tank of Louisville Railway. At Right—Storage for Turpentine, Oil and Alcohol in New Everett Shops of Boston Elevated Railway mation in regard to their method of withdrawing and checking oil. Of these 51 railways, 42 stated that oil is issued from the general storeroom on requisition. The most general method is to withdraw the oil as required, lubricating materials being handled in the same manner as other railway supplies. This method is used by 28 roads, and 14 others stated that definite amounts are withdrawn at intervals. Of these latter 14 roads, three allowed withdrawals in barrel lots, two reported withdrawals by 5-gal. lots, and three roads stated that a day's supply is withdrawn at a time. Four roads reported that oil is issued as needed, but that storeroom orders are only given by the master mechanic or foreman at regular intervals and for the quantity as shown by the measuring pumps.

Orders for withdrawals are usually signed by the foreman in charge of the carhouse or by the master mechanic. These are recorded and tabulated. It is quite general practice to have monthly statements made showing the material on hand the first of each month, the material received and the material used during the month. Eighteen railways state that definite monthly checks are taken, according to this method. The oil checking sheets are usually made by the company's auditor, and duplicate records are sent to the carhouse foreman in addition to the various officials who are interested.

On some roads the oil house is in charge of a separate man. In such cases requisitions are usually issued on the storeroom, and a copy of the requisition is retained by the oil-house foreman when oil is withdrawn. On fifteen railways oil is taken care of by carhouse foremen or shop departments and is not handled by the storage department.

The quantities of various lubricants used are followed up very closely by representatives of the oil companies who visit the railway properties, and the electric railways are materially assisted by these representatives for the helpful methods which they introduce and the expert advice which they give. These men have the confidence of the various oilers and the men intimately connected with the work and co-operate enthusiastically toward securing improvements for better lubricating methods.

ONLY 40 PER CENT OF RAILWAYS RECLAIM OIL

From the replies received in this survey it is evident that many railways are not giving the attention to reclaiming lubricating oils that the subject warrants. Of the 57 railways from which information was received, 34 railways, or 60 per cent of the total, replied that they do not reclaim lubricating oils and 23 railways do reclaim oils. Four of the companies which at present have no method of reclaiming oils contemplate installing some sort of a system.

Information was also obtained as to the use made of reclaimed oils. Of the 23 railways that do reclaim lubricating oils seven use the reclaimed oil for lubricating truck parts such as center plates, side bearings and for various brake parts and door slides. Six additional railways reported the use of reclaimed oil for journal bearings. Three use the reclaimed oil in air compressors and two others use the reclaimed oil for lubricating shop tools. One railway uses reclaimed oil for freight cars, for trolley bases and door engines, for automobiles, for track and general oiling, and one road uses reclaimed oil in the same manner as new oil.

TABLE I—STORAGE SPACE PROVIDED FOR LUBRICANTS ON 35 ELECTRIC RAILWAYS

Cars Owned		Storage Space Provided for Lubricants		
Total	Passenger	Dimensions, Ft.	Area Sq.Ft.	Sq.Ft. per Car
18	16	12 x 16	192	10.67
36	30	4 x 8	32	0.89
36	24	14 x 20	280	7.78
79	39	50 x 100	5,000	63.29
93	87	10 x 20	200	2.15
103	85	9 x 28	252	2.45
122	91	10 x 15 and 12 x 16	342	2.80
151	126	12 x 12	144	0.95
166	114	12 x 18 and 20 x 30	816	4.91
172	152	17 x 17	289	1.68
180	144	12 x 20	240	1.33
183	164	6 x 12	72	0.39
205	191	14 x 20	280	1.36
210	80	12 x 16	192	0.91
214	209	20 x 20	400	1.87
223	200	10 x 20	200	0.90
234	220	13 x 23	299	1.28
253	175	21 x 31	651	2.57
254	242	14 x 14	196	0.77
266	249	10 x 40	400	1.50
288	230	10 x 20	200	0.70
3[illegible]6	231	5 each 10 x 12	600	1.84
327	140	12 x 30	360	1.10
350	274	25 x 40	1,000	2.86
358	214	15 x 15	225	0.62
384	178	16 x 30	480	1.26
409	2[illegible]9	20 x 60	1,200	2.93
435	223	18 x 45 and 19 x 61	1,969	4.52
464	407	10 x 20 and 20 x 30	800	1.72
510	400	10 x 20	200	0.39
547	414	9 x 12 and 9 x 14	234	4.28
930	738	20 x 30	600	0.6[illegible]
1,469	1,246	2 floors 20 x 40	[illegible]	0.54
1,850	1,709	4 each 10 x 15	600	0.32
3,592	3,106	30 x 50	1,500	0.42
15,438	12,377		21,245	1.38

Due to the increased number of gasoline-driven service trucks by electric railways, and the fact that many electric railway companies are now operating buses, the proper storage of gasoline is an additional problem. In this survey information was obtained as to the number of service trucks, tower wagons, dump trucks, buses and other gasoline-driven equipment used by electric railways, as well as the quantities of gasoline used and methods of supplying the gasoline. A total of 951 service trucks, 280 buses, 73 tower wagons, 60 automobiles and 52 dump trucks are operated by 51 railways. There were but six railways out of the 57 included in this survey that did not have some kind of gasoline-driven equipment. Replies from 50 roads regarding the quantities of gasoline used showed a total weekly consumption of 67,231 gal., or an average of 1,345 gal. per property. Of these 50 railways, 40 have their own garages, from which gasoline is supplied. Six companies stated that they obtain their supplies from filling stations and five additional railways obtain their supplies from both their own garages and filling stations.

The equipment and methods of storing gasoline follow the same general lines as are used for the storage of turpentine, alcohol and paint oils by electric railways. Of the various methods used in storing these, as given in replies from 53 railways, 22 roads reported that they store the oils in the original drums; nine roads reported the use of both drums and fireproof tanks, and eight additional roads use fireproof tanks alone. Nine roads reported that very little oil of this nature is stored, and that this is usually in small cans. Five additional railways reported that they store oils in both drums and tanks.

Information obtained as to the various quantities of alcohol, turpentine and paint oils that are stored was obtained from 26 companies. Of these, 11 reported the storage of small quantities ranging from 5 to 50 gal. Eight additional companies reported storage in lots of from 50 to 250 gal.; three reported quantities of 450 to 850 gal., and four of the larger properties reported storage of from 1,100 to 5,500 gal.

Light, Not Lamps, Determines Economy of Car Lighting

Analysis Shows Light to Be the Thing Purchased in Car Lighting—Old Lamps Should Be Discarded—Lamps and Power for Lighting Cars Cost Interborough Rapid Transit Company $125,964 per Year

By E. E. Dorting
Lighting Engineer Interborough Rapid Transit Company, New York

AT THE present time in this country there are approximately 1,250,000 outlets in electric car service in which the lighting can only be arranged by connecting five lamps in series. The lamps for this class of lighting are known as Mazda "B" street railway lamps and require the utmost skill in manufacture due to the close selection which is necessary for series burning. Lamp manufacturers have divided this group of railway lamps into four sizes, namely, 23, 36, 56 and 94 watt, and supply any of these wattages for five in series on 525, 550, 575, 600, 625 and 650 volts. Of these four types the demand by consumers averages about 40 per cent of the 23-watt, 40 per cent of the 36-watt, 15 per cent of the 56-watt and 5 per cent of the 94-watt sizes. The following table gives a complete description of these lamps:

STREET RAILWAY MAZDA B LAMPS

Nominal Watts	Bulb*	Rated Initial Lumens	Rated Initial Lumens per Watt	Mean Lumens per Cent of Initial	Hours Life	Amp.	Standard Package	List Prices
23	S17	†224	9.6	87	1,500	0.214	120	$0.30
36	S19	†382	10.1	85	1,500	0.342	120	.30
56	S21	†603	10.3	81	1,500	0.519	120	.35
94	S24½	†1,032	10.4	74	1,500	0.863	50	.90

* All these lamps have standard medium screw base
† The lumens given cover only lamps for five in series used on 575 volts. The lumens for other lamps are in proportion to the volts

From this table it will be noted that the average life as guaranteed by the manufacturer is 1,500 hours. This of course is determined by running life tests on the various sizes and then applying the proper initial lumens per watt rating. In this connection it is interesting to know that in the past five years, due to improvements in manufacture, for the same life (1,500 hours) the initial lumens per watt rating have been increased 15 per cent, thereby giving more light for the same power consumption. Of course this life testing is done under ideal conditions with the lamps receiving no shock or vibration. However, the life of a lamp, which has been placed at 1,500 hours for railway lamps, is an arbitrary figure. It is not used as a basis for determining a rebate, if the lamp does not give that length of service. In subway car lighting the results in service showed an average life of 1,644 hours.

Regardless of what type the lamps may be or the class of lighting for which they may be used—residential, industrial, railway, etc.—the average length of service per lamp should be governed by the cost of that lamp, the cost per kilowatt-hour of energy, and the fixed cost per socket per thousand burning hours.

For example, let us assume that the cost per kilowatt-hour delivered from the third rails in electric car lighting is 2 cents, the lamp a 36-watt size costing 22 cents net, and the fixed cost per socket per thousand burning hours 0.015 cents. By calculation we find that the average life per lamp should be about 1,900 hours. On the other hand the life per lamp should be much longer for cheaper power and vice versa for more expensive power. Up to the present time this life per lamp as determined by calculation can only be controlled in service by a lamp which will withstand the severe shock and constant vibration. In this respect probably the 56 and 94-watt types are strong enough, but their application to car lighting is confined strictly to center deck arrangement, on account of the fewer outlets per car due to the high individual wattage rating of same. This does not give a good uniform distribution of light throughout the entire car. In addition the characteristic curves of the 56 and 94-watt lamps for lumen maintenance throughout life are very unsatisfactory on account of bulb blackening.

In the following table the actual cost of lighting is illustrated, because after all it is light that we are buying. Again using a 2 cents per kilowatt-hour lighting cost and referring to the table headed "Street Railway Mazda 'B' Lamps" the following is determined:

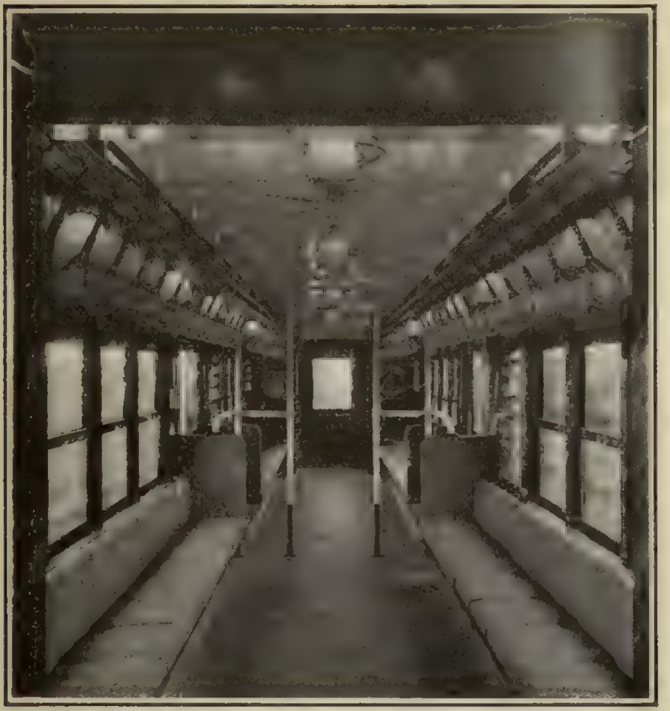
COST OF LIGHTING PER LAMP

Nominal Watts	Initial Lumens	Mean Lumens, per Cent of Initial	Hours Life	Energy Consumed, Kw.-Hr.	Total Energy Cost	Lamp Cost	Total Cost	Total Initial Lumens	Mean Lumens	Cents per 10,000 Lumen-Hours
23	224	87	1,500	34.5	$0.69	$0.21	$0.90	286.000	254,540	3.11
36	382	85	1,500	54.0	1.08	0.21	1.29	573,000	498,510	2.25
56	603	81	1,500	84.0	1.68	0.245	1.925	904,500	750,735	2.12
94	1,032	74	1,500	141.0	2.82	0.63	3.45	1,548,000	1,145,520	2.23

Note: Above data calculated for nominal watts rating or assuming the d.c. circuit averages 575 volts. Lamp cost based on 30 per cent discount from the list price.

From these figures, one deduces that the 23-watt size is the most costly based on manufacturer's data, and that the 56-watt lamp is slightly more economical than the 36 or 94-watt types. However, this company has standardized on the 36-watt type and after keeping accurate records of life in service together with the results obtained in the way of proper light distribution throughout the car, we have been convinced that this is the most practical lamp due to the high lumen maintenance during life.

The service life record was obtained by running a ten-car test train over the systems, both elevated and



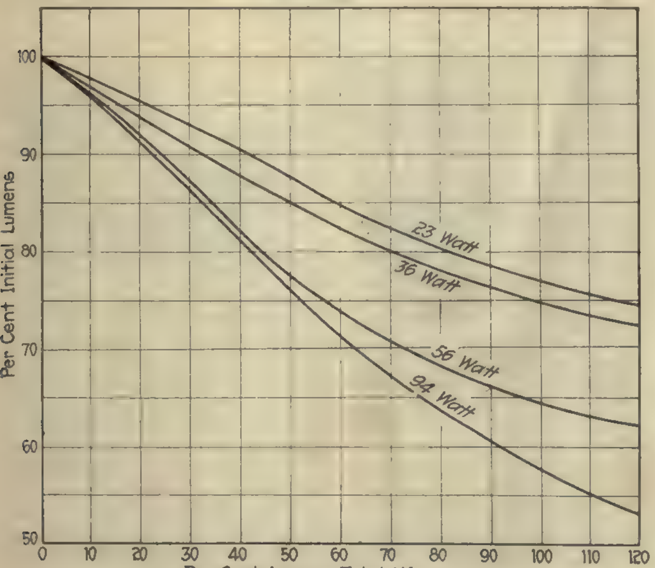
Twenty-five 36-Watt Lamps with Shades Furnish Illumination for a Subway Car of the Interborough Rapid Transit Company

subway, and noting the conditions of the lamps that failed due to various causes. The following table shows the cause of failure of the two groups of lamps:

INSPECTION OF DEAD LAMPS TO DETERMINE CAUSE OF FAILURE

Failure	Elevated Cars Per Cent		Subway Cars Per Cent
Broken filament (fair life)	17.5		33.0
Broken filament (short life)	42.0		53.0
Burnt out (fair life)	17.5		13.0
Burnt out (short life)	3.5		...
Broken tip (filament unbroken)	10.2		....
Broken hook	3.5		1.0
Loose base	5.8		..
Total lamps inspected, elevated cars	86	Subway cars	100

Another record of lamp failure on subway cars clearly shows that broken filament is the cause of 80 per cent of the removals, while only 6 per cent are removed because of burned out filament. Even with this high ratio of broken filaments the average life of the 171 lamps observed was 1,592 hours.



Performance Curves of Mazda B Railway Lamps Burning Five in Series

INSPECTION OF 171 LAMPS IN SUBWAY CARS TO DETERMINE CAUSE OF FAILURE

Cause of Removal	Number of Lamps	Per Cent
Broken filament	138	80.0
Burnt out	10	6.0
Loose base	2	1.3
Interlocks	10	6.0
Broken bulb and rod	2	1.3
Broken button rod	2	1.3
Broken tip	6	3.5
Air leaks	1	0.6
Total	171	100.0

Average life in service of these lamps = 1,592 hours

Considering these same 171 lamps from a light efficiency angle it was found that the average lumens at failure was about 70 per cent of the initial lumens. This indicates that the average lumen maintenance was 87 per cent during life, which checks the curve for 36-watt lamps.

Another inspection of the test lamps disclosed the fact that 94 lamps had from one to nine interlocks, that is, shortened filaments due to the welding of broken strands. However, of this number only in ten cases had interlocks caused the failure. The average number of interlocks per lamp was nearly two, while for lamps with 70 per cent and 60 per cent of the initial lumens, the average interlocks was 2.5.

INSPECTION OF 171 36-WATT LAMPS

For bulb condition

Condition of bulb (blackening)	Indeterminate	A	B	C	D
Number of lamps	1	103	42	22	3

where A = 80 per cent, B = 70 per cent, C = 60 per cent and D = 50 per cent of the transmission of clear glass.

For interlocks

Number of interlocks	Indeterminate	0	1	2	3	4	5	6	7	8	9
Number of lamps	35	42	27	29	12	9	4	7	3	2	1

Average number of interlocks per lamp = 1.95
Average number of interlocks in B and C class bulb condition = 2.5

That buying light is an important factor in the operation of the rolling stock of Manhattan Elevated and subway cars of the Interborough Rapid Transit Company is shown in the following tabulation:

MAZDA "B" RAILWAY LAMPS CONSUMED AND COST OF LIGHTING CARS ONLY

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK CITY. YEAR 1923

Month	Number of Lamps Replaced Subway	Manhattan "L"
January	12,900	9,845
February	12,700	7,445
March	13,200	9,710
April	18,000	6,215
May	10,600	5,111
June	15,400	3,900
July	15,800	2,190
August	15,100	6,240
September	12,400	5,300
October	10,700	6,360
November	12,000	6,400
December	15,600	5,660
Total	164,400	74,376
Average per month	13,700	6,198
Total active cars average	1,957	1,925
Number of outlets	50,882 (26 per car)	48,125 (25 per car)
Number of lamps, 1923	164,400	74,376
Lamps per outlet per year	3.23	1.54
Average burning hours per outlet per year	5,300	2,190
Hours life per lamp	1,644	1,422
Total cost of lamps per year	$33,338	$15,128
	(19.84 cents net and 0.50 cents etching)	
Actual watts per outlet	35	33
Total kilowatt-hours 1923	9,438,611	3,477,993
Cost kilowatt-hours, coal and water	$56,631	$20,867
	($0.006 per kw.-hr.)	
	Summary	
Cost of energy	$33,338	$15,128
Cost of power	56,631	20,867
Total	$89,969	$35,995
Grand total	$125,964	

Although $125,964 is a significant figure, lighting of the cars is only a portion of the total lighting cost on this property, which for a year averages approximately $350,000 for power and $150,000 for lamps.

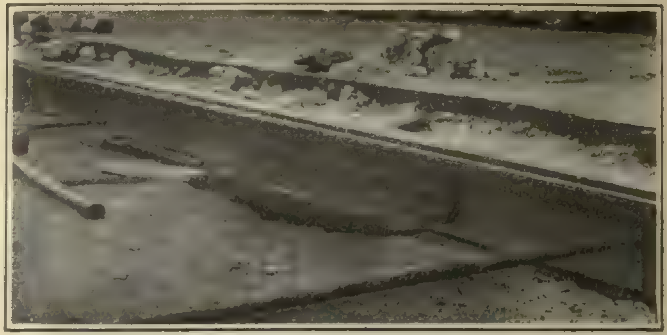
In the subway and "L" cars there are 100,000 36-watt lamps. This type of lamp fulfills the requirements for side lighting and is more economical than the 23-watt lamp, the other possible choice for this type of illumination. However, the 36-watt does not stand the shocks and vibrations as well as the higher wattage lamps.

While the argument may be advanced that 56 and 94-watt lamps are mechanically strong enough to withstand the shock, it will be found that due to the excessive bulb blackening characteristic of these higher wattage vacuum lamps they are more expensive to operate. It would be better to remove the lamp after 60 per cent of its life had been spent than to continue to burn it to 100 per cent life and receive less and less illumination per watt-hour consumed. This is true on any large diameter filament used in a vacuum lamp. With an investment of 24½ cents in the 56-watt and 63 cents in the 94-watt the upkeep or power cost (assuming 2 cents per kw.-hr.) over the last 40 per cent of its life amounts to more than twice the cost of a new lamp. It is evident that during the latter half of the lamp's life the efficiency drops off rapidly. The accompanying chart shows this. Notice how closely the 23 and 36-watt curves run together, with the 56-watt lamp curve falling off decidedly more, and that for the 94-watt lamp, from 50 per cent life on to burnout, dropping even more sharply than the 56-watt size.

Replacing Rail on Old Track Foundations

Wood Block Fillers Cut to Make Flangeway and Permit Use of Low T-Rail—Planks Support 7-In. Girder Rail, Replacing 9-In. Rail Previously Used.

THE excellent condition of some old creosoted wood ties and concrete track foundation recently led the Memphis Street Railway, Memphis, Tenn., to adopt two unusual expedients in order to preserve ties and foundation when replacing the old rail with new rail of a different height. In one case the original rail was so low that it was difficult to install new rail level with the pavement. In another case the removal of high rail left a space to be filled.

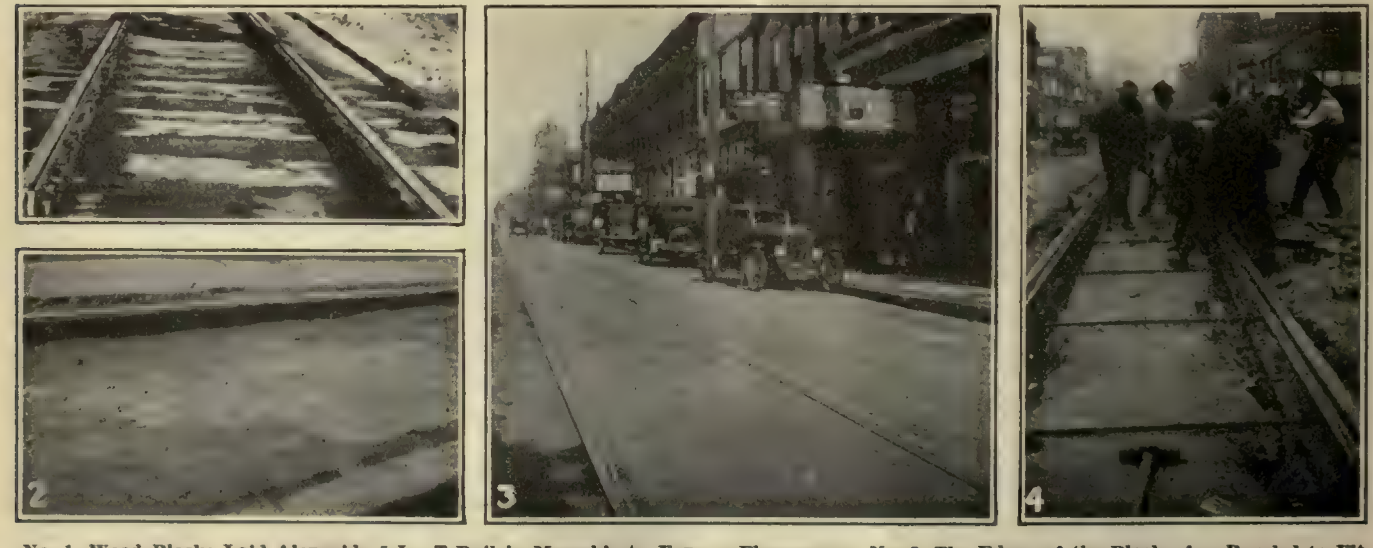


Planks Under the Rail Permit the Substitution of 7-In. for 9-In. Rail without Disturbance to the Track Foundation

When the railway began the reconstruction of a track which had been originally built with 70-lb. 4¾-in. T-rail it was found that the creosoted ties laid in 1910 were still in good condition. Because the available space between the top of the ties and the surface of the pavement was too small, it was impossible to use 7-in. grooved girder rail, which is now the company's standard. As an alternative it was decided to use 5-in. 80-lb. T-rail and cut wood blocks to form flangeways.

These blocks were cut at the mill to such a shape that one edge fits snugly under the head of the rail and the top of the block is about level with the tread of the rail, making a flangeway of approximately the same dimensions as in the standard A.E.R.E.A. 7-in. grooved girder rail. Concrete base with an asphalt surface was then laid. In doing this work the railway found it important to pour the concrete soon after laying the wood blocks, so that traffic would not break their edges.

On Main Street, when it became necessary a short time ago to replace the old 9-in. tram rail, it was again desired to preserve the old track foundation and the still serviceable creosoted ties laid in 1905. The method adopted was to lay 2-in. creosoted pine planks lengthwise under the rail. In this way the new 7-in. rail was laid on the same ties which had formerly carried the 9-in. rail and the tread was brought to approximately the same level. Tie plates were used over each tie between the rail and the plank and two screw spikes run through from the rail into the tie. The paving used is the same as that with the T-rail, concrete with an asphalt surface.



No. 1. Wood Blocks Laid Alongside 5-In. T-Rail in Memphis to Form a Flangeway. No. 2. The Edges of the Blocks Are Beveled to Fit Under the Rail Head. No. 3. The Finished Job Has Nearly the Same Appearance as with Grooved Girder Rail
No. 4. Holes for Screw Spikes Are Bored with a Long-Handled Bit

How Rail Corrugation Has Been Eliminated in Pittsburgh

Investigations Were Made of the Circumstances Under Which in the Past Corrugation Developed and a Track Structure Was Designed to Prevent Its Recurrence

By I. E. Church
Assistant Superintendent of Carhouses, Pittsburgh Railways

AS A RESULT of careful studies of rail corrugation, considerable data have been collected by the Pittsburgh Railways from which probable explanations of the cause of this phenomenon have been deduced. Of greater importance, however, is the fact that study of the conditions under which in the past corrugations have developed has led to the design of a standard type of track structure which is practically free from trouble of this sort.

The Pittsburgh Railways was a particularly good field in which to make these investigations, because so many different rail sections and types of track structure are in use. For many years track construction was practically uniform. Then within the space of a comparatively few years nearly everything relating to the track in paved streets was changed. A heavier, higher rail was adopted. From 6-in. and 7-in. rail, a change was made to 9-in., and about the same time a change from bessemer to open hearth rails. Thermit and electric welded joints replaced bolted joints. Brick or stone pavement laid in sand was superseded by concrete. This made an excellent street for automobiles, but resulted in much more serious trouble from corrugation. With the old structure corrugations developed to some extent, principally on curves and approaches to bridges, but on a much smaller scale than with the new structure where miles of straight track from one to three years old showed corrugations.

On many railways corrugations did not become bothersome until concrete was used extensively in track construction. It was natural, therefore, that the solid type of foundation and pavement should be blamed for corrugated track, but this cannot be proved. In Pittsburgh there are corrugated rails where no concrete is used and also solid track construction with rails in as good shape as ever. Where concrete is used, however, more care must be exercised in construction, particularly as regards foundation, alignment and gage.

With the old 7-in., 70-lb. tram rail it was almost impossible to keep the track from getting wide. So while it was generally conceded that there should be ¼ in. to ½ in. between wheel and track gage, it became the habit to tighten up the gage, the theory being that "it will get wide soon enough."

With the use of 7-in., 122-lb. and 9-in., 134-lb. Trilby rail this same practice was followed. This, with the concrete construction now in general use, holds the track to gage for several years. In some cases it seems that the track must have tightened, due probably to the expansion and contraction of the rail.

On the Pittsburgh Railways we have no record of any corrugation occurring previous to 1915. Up to that time our standard was the tram girder rail, mostly 7-in. rail, although considerable 9-in. rail was used between 1910 and 1915. The foundation, the method of paving and the rail joints were different from the present standard. We have, however, some tram rail left over from previous construction that has been laid more recently in accordance with modern methods of construction.

It was stated by men long on the system that the old tram rail never corrugated. An inspection made by the writer of rail 20 years old nevertheless showed corrugations 4 in. to 8 in. long that were hardly noticeable in service, although 0.015 in. deep. Some of this track when reinforced and brought to standard gage developed shorter corrugations 1½ in. to 3 in. long which were very noticeable. Another significant fact was that the 9-in. tram rail showed more of a tendency to corrugate than did the 7-in. rail.

Coming to the newer rail, which is of the Trilby 7-in., 122-lb. and 9-in., 134-lb. section, we found great

Location	Date of Construction	Gage	Corrugations
Forbes St., Court House to Brady St.	Prior to 1915	⅛ in. to ¼ in. wide	Scarce.
Forbes St., Craft Ave. to Murray Ave.	1915, 1917, 1918, 1922	⅛ in. tight to ⅛ in. wide	Throughout.
Fifth Ave., Sixth Ave. to Craig St.	Prior to 1915	⅛ in. to ⅜ in. wide	Few except on curves.
Fifth Ave., Craig St. to Highland St.	1915, 1918, 1919	Standard to ⅛ in. tight	Throughout.
Penn Ave., 11th St. to Main St.*	Prior to 1915, relined 1921	Standard to ¼ in. wide	Very few.
Penn Ave., Main St. to Negley Ave.	1916–1917	Standard to ⅛ in. tight	Wherever tight.
Penn Ave., Negley Ave. to Highland St.	1915–1916	Standard to ⅛ in. tight	Wherever tight.
Frankstown Ave., Lincoln to Oakwood	1919–1920	⅛ in. to ¼ in. tight	Very bad.
Frankstown Ave., Oakwood to Tioga	1920	⅛ in. to ¼ in. tight	Very bad.
North Side-Brighton Road, outbound		Standard	Infrequent.
North Side-Brighton Road, inbound		¼ in. wide	None.
North Ave., Monetay, Jarvella and Jackson		Standard to ⅛ in. tight	Slight on standard section; bad on tight section.
East Ohio St., Heinz to City Line	1920	⅛ in. to ¼ in. tight	Scarce.
Eighth Ave., Ann to Amity	1920	Standard to ½ in. tight	Slight.
Eighth Ave., Hays Jct. to 7th Ave.†	1920	⅛ in. to ¼ in. wide	None.
Fifth Ave., 2nd Ave. to Ann St.		Standard	None.
West Carson St., Point Bridge to Main St.		Standard	Slightly throughout.
West Carson St., Main St. to Corliss Tunnel		⅛ in. wide	None.
Island Ave., Corliss Tunnel to McKees Rocks		⅛ in. wide	Slight in a few spots.
Chartiers Ave., Crafton outbound†		⅛ in. to ¼ in. wide	None.
Chartiers Ave., Crafton inbound†		Standard	Very slight in spots.
Chartiers Ave., McKees Rocks†	1917	Standard to ¼ in. wide	Very slight on standard sections

Note—Rail is 9-in., 134-lb. section except where otherwise specified. * 125-lb. rail. † 7-in., 122-lb. rail.

variation in the matter of corrugation. One section half a mile long laid in 1915 showed no corrugations, while another half-mile section on the same street laid in 1920 was considerably corrugated. On the first section, about one-third of the joints were thermit welded, the others being bolted, while all the joints on the second section were thermit welded. There was no other constructional difference except that the first section was about ⅛ in. wide of gage while the second section was about ⅛ in. tight of gage. This gave us an idea. A check was then made of the gage at various places where the rails were corrugated and at other points where no corrugation was visible. A brief summary of our experience appeared in the ELECTRIC RAILWAY JOURNAL for Feb. 16, 1924, page 256. Details are given in the accompanying table.

It will be seen that the intensity of corrugation follows closely the condition of tight gage. In fact, about 90 per cent of our track in which serious corrugations have developed is standard gage or less than standard. In this connection it is interesting to note a report recently made by one of our supervisors.

"On Butler Street between 34th and 48th Streets, there are no signs of any corrugations. The gage is 5 ft. 2½ in. or slightly wider; at no point is it tight. Between 48th and 52nd Streets the gage is irregular, running from 5 ft. 2½ in. to 5 ft. 2 5/16 in. In all places where gage is correct or only 1/16 in. tight there are but few corrugations and these very slight, but in places where it is more than 1/16 in. tight, corrugations are frequent and their depth is greater the tighter the gage. Between 52nd and 62nd Streets, the track in most cases is about ¼ in. tight, and in this stretch the corrugations are worse than on any other section of Butler Street. Even in this stretch at points where gage is correct or only 1/16 in. tight there are no corrugations.

"On Forbes Street between Oakland and Craig Streets, conditions are the same as on Butler Street. The track here in places is ¼ in. tight and in other places it approaches correct gage, and in all cases the rule seems to be, the tighter the gage the heavier and more frequent are the corrugations. On Forbes Street between Atwood and Halket Streets the track is tight, gage being between 1/16 in. and ⅛ in. narrow. The corrugations are not nearly so bad here as in the stretch between Craig and Oakland Streets.

"Fifth Avenue between Craig and Highland has an irregular gage, most of it being from ⅛ in. to ¼ in. tight. The corrugations were bad in this stretch. In many cases they are returning after being ground out, and in most such cases the gage measures tighter than where they are not returning.

"On Liberty Avenue between Center and Millvale Avenues, where corrugations are showing up, the gage is from 1/16 in. to 3/16 in. tight. The stretch on Wood Street between Tioga and Hill Streets, which was corrugated badly but last year was resurfaced, regaged and corrugations ground out, shows no signs of corrugations returning. We resurfaced, regaged and ground out the corrugations on a stretch of 600 ft. of badly corrugated track on Forbes Street between Semple and Halket Streets, and no corrugations have

"On Highland Avenue between Stanton and Bryant Streets small corrugations had appeared in many places, but with the exception of a large radius curve near Bryant Street the corrugations have now disappeared.

"From this inspection I concluded that tight gage is the principal contributing factor causing corrugations. I think the reason they show up to such an extent in our newer work is that the rails are so imbedded in concrete that in case of tight track the wheels cannot move rails out to sufficient gage clearance. The wheels are therefore alternately rising and falling, and exerting differing pressure on the head of the rail. The stress on the flanges of the wheels in tight track may also cause excessive vibrations, which would not be the case provided the rails were sufficiently far apart. Probably in old type work where concrete was not used, even if track was laid tight, the wheels would quickly force them out to sufficient gage, and even if corrugations appeared while the gage was tight, they were rolled out after the rails had loosened up or been forced out to wider gage."

Another factor that has proved to be a cause of corrugation is poor or wet foundation. By digging up the track in a number of places where corrugations were bad, we found the ties from ½ in. to 1½ in. below the base of the rail. This left the rail unsupported at these points so it would sink during the passage of a car over it. The claim was made that the corrugations came first and the vibration due to them loosened the rail and pounded the foundation loose. This was hard to disprove, but a good argument to the contrary was that after grinding the corrugations out of such a track, they reappeared at the low points very soon.

A test was made to demonstrate this point by interchanging pieces of rail on two widely separated pieces of track, one corrugated and the other not corrugated. The loose track was resurfaced and the corrugations ground out about a year ago. Up to the present time no corrugations have reappeared. The section of corrugated rail gradually lost its roughness, until now it is as smooth as the rail adjacent to it.

PRESENT STANDARD TRACK STRUCTURE DOES NOT CORRUGATE

With our present type of construction, where a good heavy bed of ballast is laid under heavy wooden ties which support the rail, we are thoroughly convinced that we can build track that will not corrugate. Having come to this conclusion, we have lost interest in the theoretical question as to what action takes place causing rails to corrugate.

All rail is now laid on heavy wooden ties as the best known method of securing a resilient support to absorb vibrations caused by the normal action of the cars running over them. Track is so laid that nowhere is it less than ¼ in. wider than the wheel gage of the cars. It can be even wider if the guard will permit. The foundation for the ballast is solid and well drained. Ballast is well packed under the ties and confined sufficiently to prevent it from being pounded out of place. Special care is exercised in getting the track true as to level and alignment when concrete pavement is used.

In order to get rid of the corrugations we already had, we realigned and resurfaced the worst sections and ground the rail smooth with a reciprocating grinder. The corrugations on track so treated show no signs of returning. Track not so badly corrugated was simply ground without resurfacing. On part of this track corrugations returned to some extent. After operating the reciprocating grinder a few months, it became apparent that we needed about six similar machines, or must develop some faster method of grinding. It was therefore decided to fit up a car with four sets of the same grinding bricks as used on the reciprocating grinder. At first this car was used during the day, running with the traffic over certain sections. It was found, however, that better results could be obtained by several trips back and forth over a short stretch of about 1,000 ft., and this could be best done at night when traffic was much lighter.

The car is a retired single-truck unit that happened to be particularly suited to the installation of this grinding equipment. The girders for holding the brick boxes were made part of the truck frame. Each brick box, containing four bricks 2½ in. x 4 in., is hung from a 6-in. x 10-in. air cylinder which is attached to the car by means of braces fastened to the side sills. Thus the car body acts as a weight to hold the bricks on the rails, with the air in the cylinder and the car body springs as cushions to take care of unevenness. The air cylinders are controlled by a three-way valve at the hand of the motorman so the bricks can be instantly raised or lowered as stretches of corrugated or uncorrugated track are approached. This is also very handy in crossing over special work or going around sharp curves. There is a total pressure of about 10,000 lb. on the 16 bricks and it was found necessary to install two 100-hp. motors to propel the car. This car was found particularly useful on grades and curves where the reciprocating grinder could not be used.

A water tank is mounted inside the car with pipes supplying water to the rail ahead of the grinding bricks. A hose with a hydrant adapter is carried on the car so the tank can be filled from the city hydrants as is needed.

The cost of grinding with the reciprocating grinder averages about 15 cents per foot, exclusive of the power taken by the motor. The cost of grinding with the car averages about 7 cents per foot, including the power taken from the line. The speed of grinding averages about five times as fast as the reciprocating grinder. In other words, the car does the work of five reciprocating grinders at one-half the cost, besides causing much less interruption to traffic.

With this car and the reciprocating grinder, we have got ahead of the corrugations on our system. We are using this car now to take out slightly corrugated spots. Used in this way, the corrugations can be removed from a stretch of several thousand feet of single track in one night.

Better Concrete Results from Field Tests

How the Capital Traction Company Has Improved the Quality of Concrete Pavement in Washington by Careful Measurement of the Quantities of Materials Used—Track Structure Consists of T-Rails on Rock-Ballasted Chestnut Ties

DUE to the general resurfacing of Connecticut Avenue, Washington, D. C., about a year ago, it was necessary for the Capital Traction Company to resurface between its tracks and pave with concrete to conform to the work being done by the city. On this job the slump test for the continued inspection of the concrete mix was used for the first time by the company. The results of the first year of service of this pavement have been so satisfactory that unless some better method is developed for regulating the consistency of concrete, R. H. Dalgleish, chief engineer, intends to use this test on all future work.

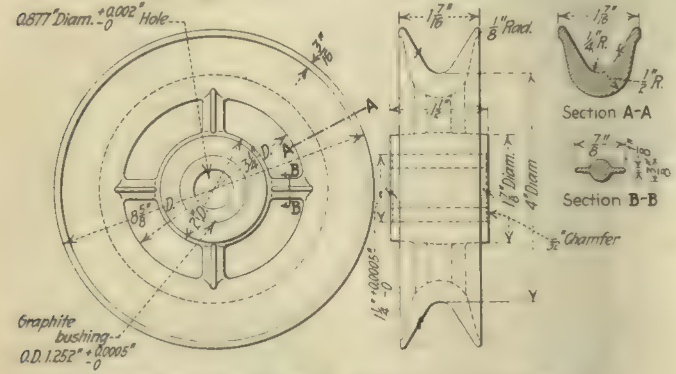
The construction used on this street consists of 5-in. T-rail on chestnut ties supported by rock ballast, pneumatically tamped. Above the ballast is a layer of concrete extending from the bottom of the ties to the top of the rail. Special care was taken to leave a groove inside the rail sufficiently wide and deep to permit passage of the largest wheel flanges. A cross-section of this track structure is shown in an accompanying sketch.

Particular attention was paid in mixing the concrete to insure the use of proper proportions of the various materials. Small boxes, such as shown in an accompanying illustration, were used for measuring the aggregate. The proportions of the mixture, which were 1:1.9:3.8, were carefully watched by inspectors. The aggregate used for the greater part of this job was coarse sand with crushed bluestone running up to 4 in. in size. Some gravel was used, however, because the railway was unable to get a sufficient quantity of stone.

Concrete was poured from the mixer to position in the track structure by a metal chute. It was then tamped around the ties and rail by hand and finished by rolling with a 15-lb. roller. This weight has been found by the railway to be just heavy enough to bring the mortar to the top of the mixture and produce a smooth finish. The surface was

A 15-Lb. Roller Was Used to Bring the Mortar to the Surface

purchased under the American Electric Railway Engineering Association specification Dw 3b. Two objections were found, however, with this specification. The first was with the minimum and maximum tensile strength in pounds per square inch called for in the specification. This for the 133,200 circ.mil area used on the system was minimum 51,600, maximum 56,000 lb. To get this maximum tensile strength manufacturers sometimes found it necessary to anneal the wire between passes. In consequence, in the new specifications, the maximum tensile strength is omitted entirely. At the same time the minimum tensile strength for the No. 00 wire was raised from 51,600 to 54,500 as laboratory experiments showed that this new minimum could be met.



Trolley Wheel Now Standard in Detroit

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CAUSES OF TROLLEY BREAKS, DEPARTMENT OF STREETRAIL WAYS, DETROIT

	Division No. 1	Division No. 2
1. Worn wire	11 per cent	41 per cent
2. Flaws in wire (a)	16 per cent	1 per cent
3. Crystallization of wire	29 per cent	40 per cent
4. Wild poles	30 per cent	4 per cent
5. Broken line hardware (b)	5 per cent	4 per cent
6. Burnt down (c)	4 per cent	7 per cent
7. Broken poles or spans	0 per cent	1 per cent
8. Unknown cause	5 per cent	2 per cent

(a) Such as factory splice breaks, spots burnt by arcing, etc.
(b) Broken ears, splicers, etc.
(c) Burnt down by direct ground contacts.

Examination of trolley breaks at ears shows that the wire is most apt to break at the center of the ear, and it is hoped that with the development described proper reduction in these troubles will be obtained. With the exception of a small number of 15-in. ears, a 12-in. ear with an average weight of 14 oz. is used on all straight construction.

All test material in the overhead line, whether hangers, frogs, strains or crossings, is painted red. The reason for this is that if any of it is removed by an emergency crew, owing to failure or any other cause, the crew will make a record of when and where the overhead part was removed and turn this record into the electrical engineering department so that its files will be complete.

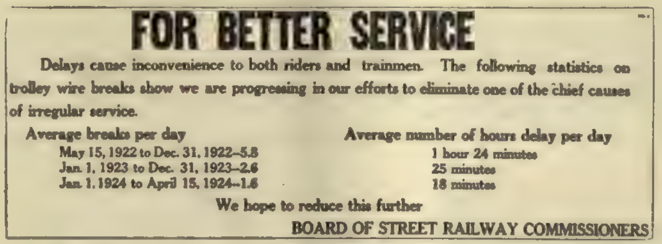
The department is still using drop forgings instead of malleable iron for certain of its miscellaneous overhead parts, such as pull-overs, bull rings, strain plates, etc., which are subject to heavy strain and blows, as

A Good Piece of Overhead Wiring at Double-Track Crossing and Curves, Detroit was then removed immediately and the concrete allowed to stand for 3 minutes before being measured. The allowable limit of slump was 2 in., and in no case during the work was the limit exceeded. As a matter of fact slumps of ⅜ in. to ¾ in. were the rule. The use of the slump test required considerable care, but the results accomplished were so satisfactory that the railway is enthusiastic over this form of field test.

During the process of this work cars were operated on single track using surface crossovers. After the concrete was poured it was kept wet for ten days by sprinkling with a hose, and traffic was not allowed on the resurfaced track until the last batch of concrete had set for that length of time. This was thought to be sufficient time to prevent any cracking of the concrete along the rails.

Trolley Breaks Cut Over 70 per Cent

Investigations in Detroit Into Means of Flexible Suspension Continue—Drop Forgings Still Used for Overhead Material—Electric Switches Have Been Changed to the Power On Type



FOR BETTER SERVICE

Delays cause inconvenience to both riders and trainmen. The following statistics on trolley wire breaks show we are progressing in our efforts to eliminate one of the chief causes of irregular service.

Average breaks per day	Average number of hours delay per day
May 15, 1922 to Dec. 31, 1922–5.8	1 hour 24 minutes
Jan. 1, 1923 to Dec. 31, 1923–2.6	25 minutes
Jan. 1, 1924 to April 15, 1924–1.6	18 minutes

We hope to reduce this further

BOARD OF STREET RAILWAY COMMISSIONERS

This Car Card Gives Very Significant Facts of How Trolley Breaks Were Reduced in Detroit

THE car card reproduced on this page was carried in a conspicuous place on the cars of the Department of Street Railways during May. Graphically, the same records are shown in greater detail and for a longer period in the accompanying table and the chart on this page. Both give results of extended study into the causes and remedies of breakdowns in the overhead system. Parts of this story were published in the issues of this paper for May 19, 1923 (page 845) and Sept. 15, 1923 (pages 411 and 431). Developments since those dates form the basis of the present article.

CONDITIONS ON THE OVERHEAD STRUCTURE

The track of the Detroit Department of Street Railways is made up of two parts, namely, (1) 62.74 single-track miles, built by the city of Detroit between April 1, 1920, and June 30, 1923, and (2) 311.12 single-track miles acquired by purchase of the Detroit United Railway during 1921 and 1922. Thus, the total street railway single-track mileage in the department as of June 30, 1923, is 373.86 miles.

NUMBER OF TROLLEY BREAKS, DEPARTMENT OF STREET RAILWAYS, DETROIT

Period	Total Trolley Breaks	Average per Day	Total Delay to Cars	Average Daily Delay to Cars
May 15-22 to Dec. 31-22	1,335	5.8	239 hrs.	1 hr. 24 min.
Jan. 1-23 to Dec. 31-23	950	2.6	153 hrs.	25 min.
Jan. 1-24 to Mar. 31-24	147	1.6	28 hrs.	18 min.

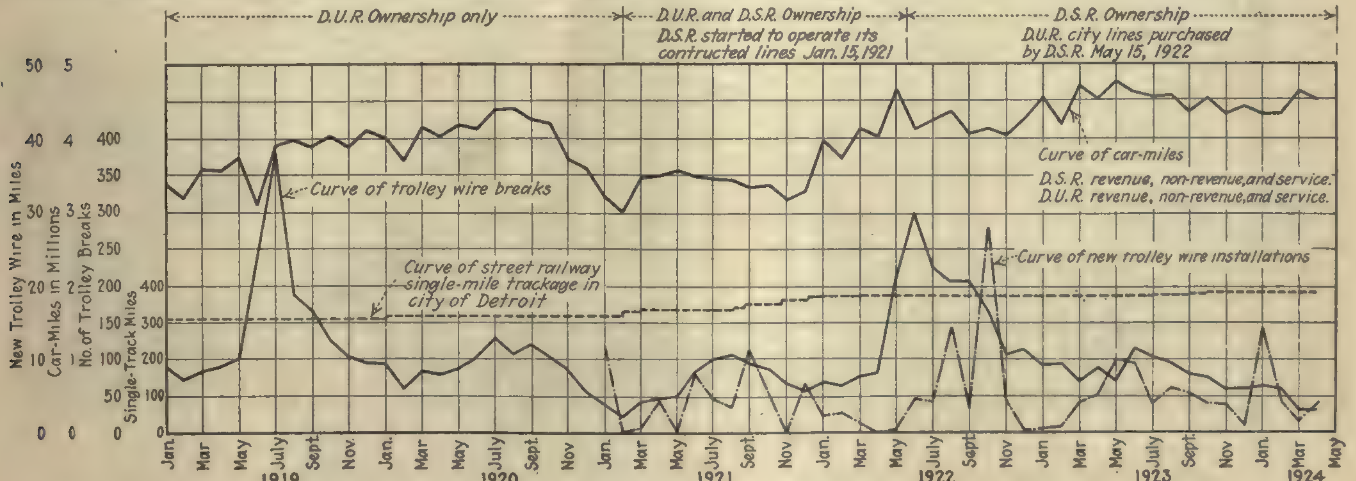
The overhead construction on Division 1 is, of course, largely new, and the lines in this division in general do not carry as heavy traffic as the lines in Division 2. On this division records are available as to wheel movement, trolley breaks, etc. The overhead construction on Division 2 is considerably older, except as parts have been renewed since the purchase of the system by the city, and the records of wire installation, wheel movement, causes of failure, etc., are not available prior to May 15, 1922, when the property was acquired.

An accompanying table shows the most common causes of trolley breaks on the two divisions.

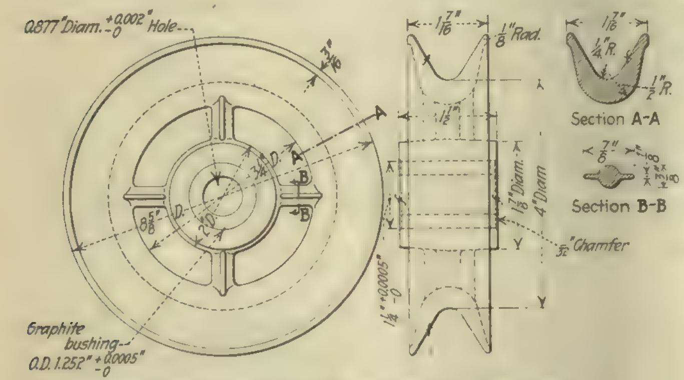
These data were compiled last year from 311 breaks, covering about 3½ months operation.

A NEW SPECIFICATION FOR HARD-DRAWN TROLLEY WIRE HAS BEEN DEVELOPED

With the exception of about 2 miles of No. 00 Phono-electric wire and 25 miles of No. 00 iron wire on Division No. 2, and about 11 miles of No. 00 Phono-electric wire on Division No. 1, the trolley wire of the system is No. 00 round, hard-drawn copper. Up to about the first of this year all new trolley wire was



This Chart Shows the Relation Between Trolley Breaks, Car-Miles and Miles of Track in Detroit During the Last Few Years purchased under the American Electric Railway Engineering Association specification Dw 3b. Two objections were found, however, with this specification. The first was with the minimum and maximum tensile strength in pounds per square inch called for in the specification. This for the 133,200 circ.mil area used on the system was minimum 51,600, maximum 56,000 lb. To get this maximum tensile strength manufacturers sometimes found it necessary to anneal the wire between passes. In consequence, in the new specifications, the maximum tensile strength is omitted entirely. At the same time the minimum tensile strength for the No. 00 wire was raised from 51,600 to 54,500 as laboratory experiments showed that this new minimum could be met.



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A Good Piece of Overhead Wiring at Double-Track Crossing and Curves, Detroit described on pages 411 and 431 of the issue of Sept. 15, 1923. It has been found that these materials last much longer, especially in cold weather. The order for pullovers of this kind was supplied by the Drew Electric & Manufacturing Company. The drop-forged steel is protected by galvanizing or sherardizing, according to the American Electric Railway Engineering Association standard specification Df 2b.

Good results are also being obtained with the adjustable pressed-steel overhead frog, mentioned in the issue of May 19, 1923. The arms of this frog are automatically adjustable from 8 deg. to 20 deg., so that they can take their natural angle when the overhead construction is being erected. Frogs of this kind have been up for two years and are still in good condition.

An important merit of this design is that the same frog is suitable for a variety of branch-offs. In consequence, the stock in the storehouse and that which has to be carried on the emergency trucks is very much less. This reduces the weight which has to be carried on the truck.

The department is also trying out an air-break section insulator, with a condenser on the top to extinguish the arc automatically. This section insulator is being developed by the General Electric Company. The ordinary type of section insulator was adequate for city cars, but the heavy interurban cars operating over the system often drew an arc across the insulator, damaging or destroying it.

MAINTENANCE OF OVERHEAD PARTS

Worn-out overhead frogs and section insulators and other overhead parts capable of being reclaimed by welding are being repaired in this way. The welding division does this work on rainy days when outside work is impracticable. The practice is for all parts of this kind to be examined during odd hours by the emergency crews, as they are familiar with this type of equipment and know what can be salvaged. The rest of the material is then turned over to scrap.

TROLLEY WHEELS

The standard trolley wheel used in Detroit is shown in an accompanying illustration. The composition is:

Copper	90 per cent
Tin	8 per cent
Zinc	2 per cent

Enough phosphorus is added to bring the Brinell hardness up to approximately 90.

A graphite bushing with case-hardened pin is used instead of a hollow pin filled with grease, and the department believes that the present practice of using a very little oil on the contact springs has been an important factor in increasing the life of this wheel. Two years ago the average life of trolley wheels on the city system was 2,500 miles. Now it is averaging 15,000 miles. Inspectors are instructed to place a few drops of oil on the contact springs every four or five days. To discourage over-oiling they are provided with small oil cans with the smallest possible spouts.

Of course, the improvements in alignment of the overhead construction and a partial elimination of steel wire have also had a great deal to do with increasing the life of the wheels.

ELECTRIC TRACK SWITCHES

Typical Single-Track Overhead Wiring at Curve

Although part of the track, the electric track switch is so closely related to the overhead construction, because of its use of a contactor, that a reference to the practice of the department in connection with the operation of track switches is appropriate in an article on overhead construction. All switches are now being changed to the "power on" type, or the kind in which the motorman passes under the contactor with power on when he wants the switch thrown and with power off when he does not want the switch thrown. Originally, some of the switches were of the "power on and power off" class, or those in which the operator uses power when going under the contactor if he wants to take the curve to the right, and does not use power when he wants to take the curve to the left. The change in type of switch used to the "power on" type is being made for two reasons.

The first is that tests have shown that with the "power on" type, the number of power applications is only about one-half that of the other type. The second is because the "power on" switch has been found to reduce derailments. With a 50-ft. car the contactor has to be back at least 55 ft. from the switch, and if two cars are running close together, especially if the first car is a safety car, it is not impossible for the second car to pass under the contactor before the first car has passed through the switch. If the switch is thrown while the first car is still on it, a derailment will occur.

It is thought that the trouble resulting from the close following of one car by another is less likely with the "power on" switch than with the "power on and power off" switch. With the former, the motorman is trained to look at the switch point and so wait for the other car to clear it before passing under the contactor. With the latter kind, where power on means the switch will go to the left and power off that the switch will go to the right, he becomes so accustomed to operating the controller so that the switch point will go in the direction he wishes that he may not take care to see that the preceding car is clear of the switch.

As the switch manufacturers make both kinds, and either kind, after installation, can easily be changed to the other kind, the matter of standardization is a simple one.

The Readers' Forum

Survey Shows Street Railways Sound

BUCHANAN & LAYNG CORPORATION

NEW YORK CITY, July 14, 1924.

To the Editors:

The letter of July 7, written by G. H. Davis to the editors of ELECTRIC RAILWAY JOURNAL, calls for some comment. My article was written in the first place to show that the street railway industry is growing even in the face of competition, and in the second place to set a standard of revenue riders per capita and revenue riders per car-mile so that each operating official could study his traffic conditions, having the data at hand for a large number of cities. These two questions should encourage a study of the underlying principles of the business.

Mr. Davis's communication reads in part as follows:

> The review of street railway traffic statistics for the period 1920 to 1923 inclusive in some of the cities in the United States having in excess of 100,000 population, written by J. F. Layng and published in your issue of June 28, shows in general a population increase with a decrease in revenue passengers carried. Of the 46 cities whose figures for 1920 and 1923 are listed, 33 show decreases in revenue passengers, and of the 19 cities between 100,000 and 250,000 population all but three show decreases in revenue passengers between 1920 and 1923. This decline in rail traffic is principally due to the operation of privately owned automobiles, and no one can now predict the end.

In Mr. Davis's conclusions he apparently does not consider the following facts:

1. Notwithstanding that the automotive vehicles had increased from 468,000 registered in 1910 to more than 15,000,000 in 1923 each city that was listed shows conclusively a large increase in the total number of passengers carried in 1923 over 1910 and also an increase in revenue riders per car-mile and per capita in 1923 over 1910 in the great majority of the cities.

2. United States Census traffic figures as quoted in my article confirm this conclusion.

3. The traffic figures B. C. Cobb used in his speech at the Midyear Dinner of the American Electric Railway Association. These figures, which were made from the A. E. R. A. records, show that the passengers carried by the electric railways of the United States were as follows:

1917	14,506,000,000
1918	14,243,000,000
1919	14,915,000,000
1920	15,540,000,000
1921	14,574,000,000
1922	15,337,000,000
1923	15,989,000,000

4. All the data presented in the various issues of the ELECTRIC RAILWAY JOURNAL and other publications showing where improvements have been made in the industry.

5. All the data and facts showing the progress and growth of the industry as presented by the president and officers of the American Electric Railway Association.

In any forecast of the future of the transportation industry consideration should be given to the following:

1. The year 1920 was a peak traffic year. This was caused by abnormal after-war conditions, especially in some cities and manufacturing centers. Therefore it is natural for such variations in traffic as have occurred, but, as shown by A. E. R. A. figures, the 1923 total traffic was greater than for 1920.

2. Mr. Davis states: "Fewer advances have been made in this business during the twenty years just ended than have occurred in almost any of our other basic industries." There are few electric roads in this country that have not adopted modern cars, modern types of track construction and improved service and operating methods in the period mentioned.

3. The lash of competition is developing the industry. It is making real progress toward a sound financial future, as is evidenced by the recent attitude of the press and investment bankers.

4. If the electric railway has such a doleful future as Mr. Davis predicts, then it will be impossible to finance the co-ordinated transportation plan that he outlines. I am convinced that the real basis of such a combine will be the present rail lines.

5. The country cannot continue to absorb automobiles indefinitely at the rate at which they were produced during 1923. The streets of the cities will some time have a traffic saturation point, and delays and inconvenience will then retard the extension of the use of automotive vehicles.

6. In many cases the private automobile, the bus and the taxicab perform a service that is not within the province of the street car. In performing this service in sparsely settled districts the community is built up and the street car system is the gainer in the end. Therefore if the street car has a steadily growing business, it should not be the cause of alarm if another relatively higher cost de luxe service is helping to build the community.

7. Mr. Davis entirely overlooks the relative cost of bus and taxicab service as compared with the cost of electric railway service. The public is interested in low fares for mass transportation and Mr. Davis does not undertake to say that en masse passengers can be transported by buses as economically as by rail cars, but leaves the general impression from his article that the bus should supersede the trolley for a large portion of mass transportation.

I believe that buses can be profitably used as feeders and to supplement rail car service to advantage in a number of instances where the traffic does not warrant capital investment for rail service. All records to date show that the yearly passengers of the entire industry are on the increase. On the financial side for the past few years the improvement is shown by the fact that traction securities have moved upward and are now looked on with more friendly eyes by shrewd investors and each year since 1919 there have been fewer properties in receivership. JOHN F. LAYNG.

The United Railways & Electric Company, Baltimore, Md., gave another radio party on June 16, broadcasting from Station WCAO. The program included some solo work and fine selections from the United Railways band and male chorus. All listeners-in who wrote to the company received a supply of literature published by the company giving the history of the street railways in Baltimore with some pictures contrasting the new and the old type of equipment. A very convenient directory of the street cars and blue bus lines was also sent out to the radio fans. The replies indicated that the radio audience numbered about 10,000 in the community.

Equipment Maintenance Notes

Southern Properties Reduce Pull-Ins

THE comparative statement of car pull-ins on the railways connected with the Electric Railway Association of Equipment Men, Southern Properties, for the first five months of 1924 shows the good work this organization is accomplishing. Figures for eight months of operation ended Aug. 31, 1923, were published in the ELECTRIC RAILWAY JOURNAL for Oct. 13, 1923. For May, 1924, and for the year to date, every railway reporting shows a higher average mileage per chargeable pull-in than the same company did in August, 1923, excepting only the Memphis Street Railway, which showed a slightly lower average for the single month. As was the case last August, New Orleans holds first place by a wide margin in the matter of mileage per chargeable pull-in, with Nashville in second place, which was occupied by Memphis previously.

Interesting figures on maintenance cost per 1,000 car-miles are also published by this association. These figures, however, include only the month of April, 1924, because it takes somewhat longer to compile the data than in the case of the pull-in record. For the year to date, the railways in Memphis, New Orleans, Birmingham, Little Rock and Nashville show lower maintenance cost than for the same period in 1923, while those in Atlanta, Knoxville and Mobile are slightly higher. Detailed figures for maintenance cost and mileage per pull-in are given.

COMPARATIVE STATEMENT OF CAR PULL-INS

	Average Miles per Chargeable Pull-In	Total Average Miles per Pull-In
New Orleans:		
May............	133,581	46,062
Year to date......	110,653	29,440
Little Rock:		
May............	19,199	16,246
Year to date......	21,797	17,364
Nashville:		
May............	57,313	30,567
Year to date......	28,920	16,254
Memphis:		
May............	15,967	13,639
Year to date......	20,853	16,033
Knoxville:		
May............	32,816	15,146
Year to date......	17,826	11,360
Birmingham:		
May............	14,869	11,450
Year to date......	13,555	10,675
Atlanta:		
May............	15,498	10,114
Year to date......	12,093	8,684
Mobile:		
May............	18,881	13,487
Year to date......	19,345	6,189
Dallas:		
May............	15,716	3,809
Year to date......	3,924	2,733
Chattanooga:		
May............	4,392	2,969

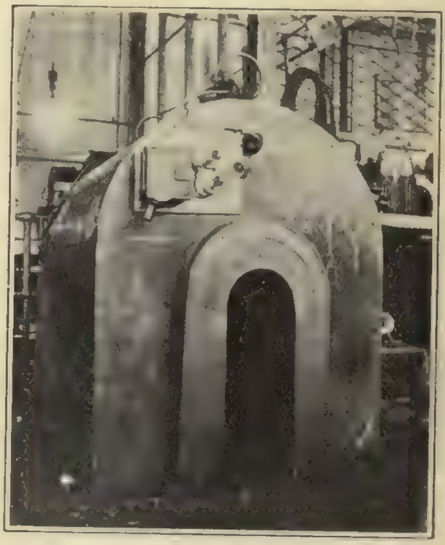
MAINTENANCE COST PER 1,000 CAR-MILES

	Supt. of Equip.	Pass. and Comb. Cars	Service Equip.	Elect. Equip. of Cars	Shop Equip. and Tools	Shop Expenses	Misc. Equip.	Total Maintenance
Atlanta:								
April, 1924..................	0.79	14.21	0.14	6.38	0.07	0.85	0.01	22.58
Year to date, 1924...........	0.71	12.10	0.23	6.07	0.13	0.95	0.04	20.26
April, 1923..................	0.87	13.06	0.17	4.66	....	0.79	0.07	19.62
Year to date, 1923...........	0.89	11.29	0.24	4.76	0.04	1.03	0.17	18.43
Memphis:								
April, 1924..................	0.98	13.35	0.42	5.86	0.07	1.05	....	21.73
Year to date, 1924...........	1.12	12.83	0.23	4.72	0.05	1.38	....	20.35
April, 1923..................	0.87	14.39	0.33	4.69	0.27	0.79	....	21.34
Year to date, 1923...........	0.97	14.04	0.35	4.31	0.20	1.07	....	20.95
New Orleans:								
April, 1924..................	0.70	15.04	0.79	4.96	0.25	1.56	0.07	23.42
Year to date, 1924...........	1.26	14.65	0.59	4.37	0.24	1.40	0.08	22.59
Year, 1923..................	2.74	17.60	0.59	12.44	0.48	1.08	0.97	35.90
Year to date, 1923...........	2.71	17.40	0.69	12.01	0.56	0.96	1.00	35.33
Birmingham:								
April, 1924..................	1.40	16.30	0.10	9.70	0.20	1.40	....	29.10
Year to date, 1924...........	1.21	13.21	0.18	7.88	0.25	1.14	....	23.86
April, 1923..................	1.50	15.00	1.00	7.10	0.30	1.60	....	26 50
Year to date, 1923...........	1.40	14.50	1.00	7.00	0.20	1.20	....	26.00
Little Rock:								
April, 1924..................	1.92	12.67	0.62	6.34	1.26	0.34	....	23.15
Year to date, 1924...........	1.91	13.45	0.34	7.12	1.64	0.37	....	24.83
April, 1923..................	1.95	13.79	0.11	9.85	0.36	1.33	....	27.39
Year to date, 1923...........	1.95	12.52	0.16	9.73	0.39	1.33	....	26.08
Knoxville:								
April, 1924..................	2.00	17.96	0.10	9.60	0.48	0.95	....	31.09
Year to date, 1924...........	1.96	17.45	0.36	8.28	0.16	0.30	....	28.60
April, 1923..................	1.96	15.73	0.23	9.89	0.11	0.38	2.17	30.47
Year to date, 1923...........	2.00	21.17	0.39	11.75	0.19	0.74	1.89	38.13
Dallas:								
April, 1924..................	0.71	13.44	0.07	7.57	0.07	1.44	0.31	23.61
Year to date, 1924...........	0.83	15.83	0.21	8.38	0.18	1.79	0.71	27.93
April, 1923..................	0.90	11.79	0.29	6.84	0.24	1.60	1.46	23.14
Year to date, 1923...........	0.76	13.76	0.32	7.51	0.31	1.72	1.33	25.71
Mobile:								
April, 1924..................	1.80	22.00	0.68	5.70	1.93	0.32	....	32.60
Year to date, 1924...........	1.83	20.90	0.63	5.20	1.93	0.17	....	30.70
April, 1923..................	1.98	15.72	1.00	5.45	2.07	0.36	....	26.60
Year to date, 1923...........	1.97	19.50	0.50	5.00	1.88	0.31	....	29.20

Portable Armature Oven

SINCE it sometimes happens that in rewinding armatures the coils do not fit in the armature slots accurately a method to permit the coils to be more readily inserted by heating is of advantage. Also by heating the coils after they are installed they soften and fit the armature slots more accurately so that there is less liability of damage from vibration while in service.

To provide a means for heating armatures while rewinding and also for drying the varnish after they are rewound, the Harmon shops of the New York Central Railroad are provided with a portable oven of the type shown in the accompanying illustration. This is made of sheet iron, approximately $\frac{1}{16}$ in. thick, and is lined with asbestos. The size of this portable oven is just sufficient to fit over an armature, and as there is no bottom this can be placed in any location found convenient. The oven is provided with four handles, two on each side at the bottom, for handling by men, and the top is provided with two rings for handling with a crane if found desirable.

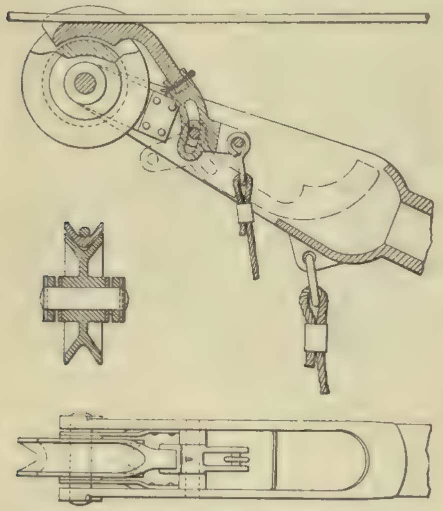


Portable Oven to Be Placed Over Armatures for Heating

Heat is supplied from eight electric heaters mounted inside. These are of the ordinary cross-seat type and are mounted vertically. A flexible connection is provided which can be plugged in at any convenient location and a switch on the end of the oven provides for opening and closing the circuit, as desired. A bank of lamps mounted on the end of the oven also serves as an indication to show when heat is on.

Combination Trolley Shoe and Wheel

A COMBINATION trolley harp, shoe and wheel has recently been designed and patented by Hugh Savage, superintendent of shops Detroit United Lines. The cars of the Detroit United Lines entering the city of Detroit are being equipped with this form of current collector. At the time of the arbitration between the company and the city of Detroit on charges for the use of the city lines by the cars of the company, the city objected to the use of a trolley shoe unless the trolley wire was lubricated. By this combination the cars of the Detroit United Lines can use the shoe on the interurban lines and then, by a slight pull on a short piece of rope, the conductor can change the collector from a shoe to a wheel. The combination has the additional advantage that the wheel can quickly be substituted for the shoe when a car has to back up on an interurban division. For straight running the company prefers the shoe collector for high-speed service.



Plan and Sectional Elevation of Harp, Wheel and Shoe, with Cross-Section Through Wheel Bearing

The construction of the combination is shown clearly in the drawing. The shoe holder is held on the harp by a pivot which passes through a curved slot. The purpose of this slot is to allow the shoe to adjust itself to the wire at all times, regardless of the variation in the height.

Dick's Bosses Discuss Plans

And He Comes Under Observation

MR. MILBURN, the new general manager of the Consolidated Railway & Light Company, who had just entered the carpenter shop with Thomas Mullaney, the general foreman, after a trip about the shops, stopped near where Dick Prescott was helping Steve, the now industrious old carpenter, who had spied the pair the moment they appeared in the doorway.

The two men seemed to have been discussing something on which they had about reached a decision, but paused to wind up the conversation before continuing their tour of inspection. Mullaney was speaking earnestly.

"Some of our foremen have been talking about this scheme for quite a while, Mr. Milburn. They seen to think we can save something by makin' drawings of maintenance parts and gettin' somebody to check up all the kinds of material we use. I've heard a lot of talk, too, about how we can get better methods here in the shops. But when I get personal, the foremen all say they're so busy with their regular day's work they can't think much about doin' things better. Anyhow, I've just called a meeting where we're goin' to talk over some of these things. Seems to me the best way to handle it's to start some sort of engineering department."

"That's a good way to go at it, Mullaney," replied Mr. Milburn. "I'm considerably surprised a shop as big as ours has worried along so long without any semblance of such a department. Go to it and find out what the foremen can do to help start it."

"I'm glad you think so, Mr. Milburn."

"Now just a suggestion, Mullaney, about how you should go at this thing to get some real results. You can't make an engineering department by painting a sign on a door and putting in some drawing boards. You'll have to get the right kind of men and give the plan your hearty co-operation if you want to get somewhere with it."

"That's goin' to be the hard part, I'm afraid."

"You're right, Mullaney. You must have a man in charge who has enough judgment and experience to get the confidence and the respect of the shop foremen, and who can soon work up to your assistant. He ought to have some imagination and enough breadth of vision that he can make real suggestions for improvements in our practices. And he must have the viewpoint of the shop departments so he can understand their needs and work out ways of speeding up routine repair work. He ought to be able to get a real system and make the regular work standard. But still he shouldn't load up the shop with a lot of needless red tape."

"I don't know if we can get that sort of a man."

"You can if you go at it right, Mullaney. You'll have to give him a real opportunity and pay him enough to keep him interested. Don't make a mistake and think he can show big results at the start, for the best sort of a man will need time to work the thing out."

"That's right, Mr. Milburn. But one man can't do it all."

"Of course not. Your man will have to build up a real department, and add to it as the work expands. Giving the plan a start is going to be hard. Suppose you begin by investigating the new methods you see described every week in the ELECTRIC RAILWAY JOURNAL, and have some one look them up regularly so that they can be discussed at the foremen's meetings. They're being used in other places, and ought to work in our own shops."

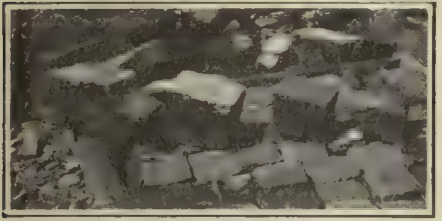
As Mullaney was about to reply, Mr. Milburn's eye chanced to light on Dick Prescott, and he interrupted.

"That young fellow Prescott over there seems to be mighty level-headed for such a young chap."

Mullaney glanced toward Dick for a moment before replying.

Recutting Granite Blocks Makes Big Saving

IN THE Cold Spring yard of the Milwaukee Electric Railway & Light Company scrap granite blocks removed from old track zone pavement are recut to sizes which may be used in special work or patchwork in brick or granite paved streets. Four stonecutters are kept busy during the summer months at this work. The company finds it is able to obtain the small-sized blocks at approximately one-half the cost of new stone.



Four Sizes of Blocks Recut by the Milwaukee Electric Railway & Light Company Are Shown

Stonecutters use discretion in cutting the old blocks into the most advantageous sizes.

Blocks as received are often large enough to make two recut 4-in. blocks. Others may be conveniently recut to a 5-in. size, while some may be converted into 3-in. blocks only. Besides these three sizes the company also has use for granite headers for building flangeways at street crossings. This size is also cut from the larger scrap block.

Cutters are paid on a piecework basis, which enables them to make as high as $8 a day. Each day a company checker counts the blocks cut during the day and the man is paid on the following basis:

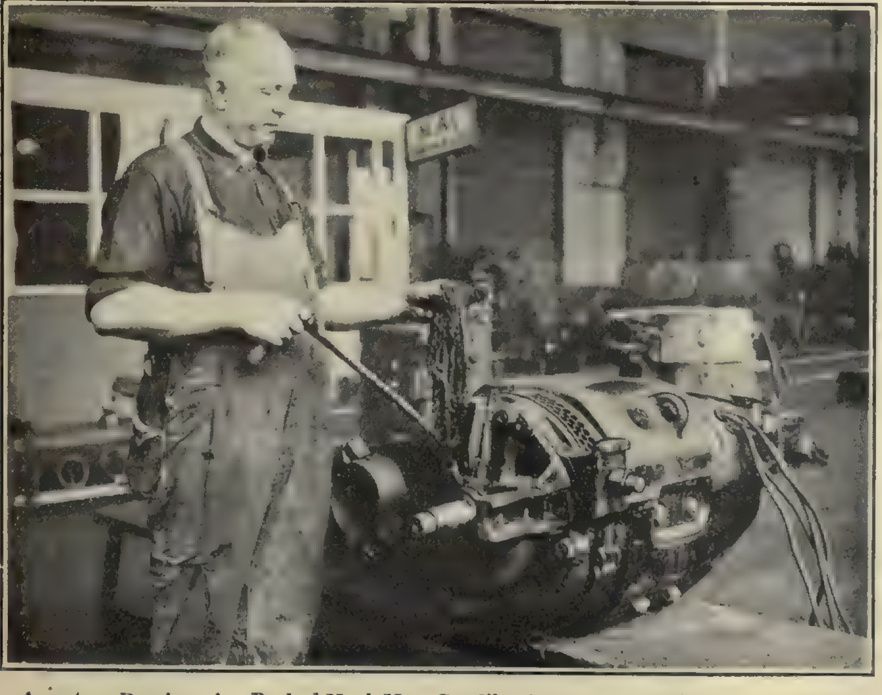
	5-In., Cents	4-In., Cents	3-In., Cents	Header, Cents
Cost	2¼	2¼	1¾	2⅝

As any one of the above sizes would cost new about 5 cents, the recutting saves more than 50 per cent of the cost of new stone. During the month of May this year 22,300 stones of various sizes were cut, this averaging approximately 1,200 per day for four men.

The old paving blocks are removed from the street and the particular job order covering this work is credited with the quantity of stone removed. As new jobs require small-size blocks they are charged with the recut stone at the above prices plus an amount covering overhead and transportation.

Low Benches Facilitate Motor Overhauling

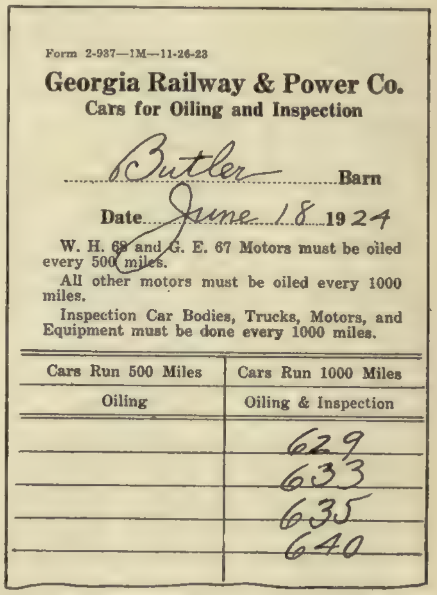
THE advantage of having motors raised from the floor while being overhauled is indicated in the accompanying illustration, showing the packing of an armature bearing. The use of a bench approximately 18 in. high has been found a great convenience while overhauling motors, as workmen are not required to bend over while doing their work, and after the motors are assembled the packing of bearings preparatory to their placement on trucks is greatly facilitated.



Armature Bearings Are Packed Much More Readily If Motors Are Raised from the Floor

Systematizing Car Inspection

CAR inspection on the lines of the Georgia Railway & Power Company, Atlanta, Ga., has recently been placed on a 1,000-mile basis. The transportation department furnishes daily to the office of W. H. McAloney, superintendent of equipment, a statement of the mileage made by various cars on the second day preceding. From these statements the mechanical department compiles a continuous mileage record of individual cars. A list showing the number of cars having run 500 miles, and of those having run 1,000 miles, is sent each day to the foreman at each carhouse. The fore-



Form 2-937—1M—11-26-23

Georgia Railway & Power Co.
Cars for Oiling and Inspection

Butler Barn

Date June 18 1924

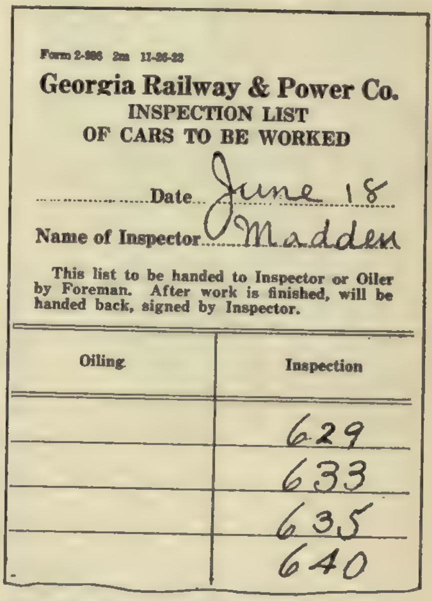
W. H. 68 and G. E. 67 Motors must be oiled every 500 miles.

All other motors must be oiled every 1000 miles.

Inspection Car Bodies, Trucks, Motors, and Equipment must be done every 1000 miles.

Cars Run 500 Miles	Cars Run 1000 Miles
Oiling	Oiling & Inspection
	629
	633
	635
	640

Form Showing the Carhouse Foreman What Cars Are to Be Inspected



Form 2-936 2m 11-26-23

Georgia Railway & Power Co.
INSPECTION LIST
OF CARS TO BE WORKED

Date June 18

Name of Inspector Madden

This list to be handed to Inspector or Oiler by Foreman. After work is finished, will be handed back, signed by Inspector.

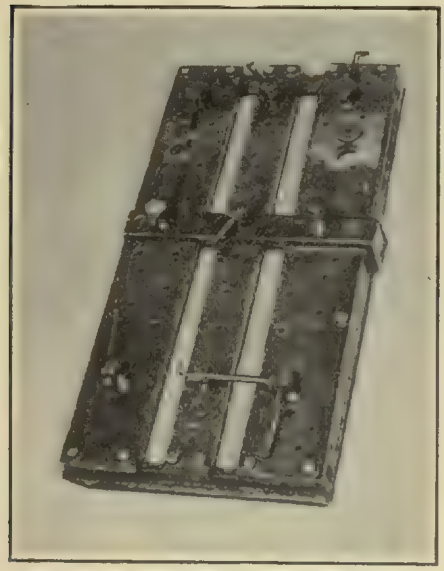
Oiling	Inspection
	629
	633
	635
	640

This List, Printed on Heavy Cardboard Stock, Is Furnished to the Man Who Inspects the Cars

man then divides the work to be done among the different inspectors and oilers, furnishing to each one a list of the numbers of the cars on which he is expected to work. This list is printed on heavy cardboard stock so that the inspector can easily write notations on it. After the work is finished he signs the list and returns it to the foreman. This system supersedes one in which the chief reliance was on the memory of the foreman at the carhouse. It has proved to be much more satisfactory than the old method.

Jig for Drilling 55 Holes

THE maintenance of contact plows for the railways in New York City, where the underground conduit system is employed, is one of the major operations of the various railway companies. The outside protective sheet iron casing for the plow requires many rivets, and these must be located accurately in order to prevent insulation breakdowns. The accompanying illustration shows a jig which is used in the shop of the Eighth Avenue Railroad for drilling the sheet steel portions of their contact plows, which are made of No. 10 and No. 12 gage sheet. This jig is provided with a number of set screws so that up to 12 of the steel sheets can be placed in position and drilled at one time. As there are 55 holes required in each sheet, it will be appreciated that the use of such a jig greatly facilitates the work of drilling, and also insures uniformity, so that the various pieces, after they are drilled, can be mated up and repairs completed without difficulty.


Jig for Drilling Sheet Steel Plates of Contact Plows

Keeping Armatures Off the Floor

IN THE shops of the Denver Tramway the arrangement shown in the accompanying illustration is used to keep armatures off the floor while they are being stored in the shops awaiting repairs or delivery to the carhouses.

The forged bars which constitute the supports are bent down at the front end, so that the armature may be rolled up on the rack without lifting. Old bearings placed over the ends of the shafts protect them from damage. Small wooden wedges prevent the armatures from rolling after placing them on the racks.

Simple Armature Racks Used in Denver

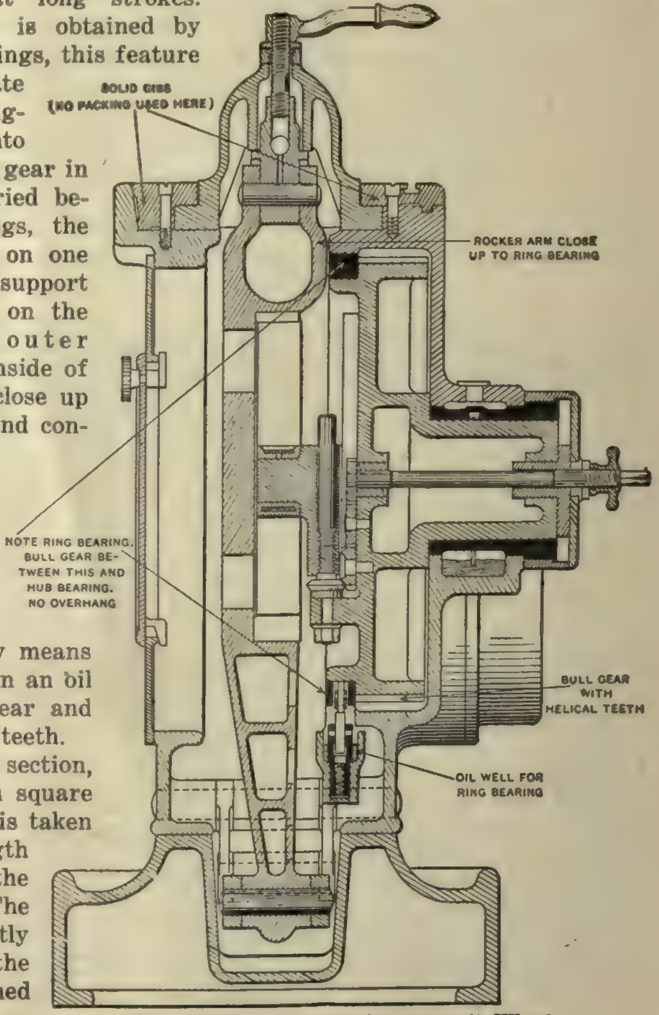
New Equipment Available

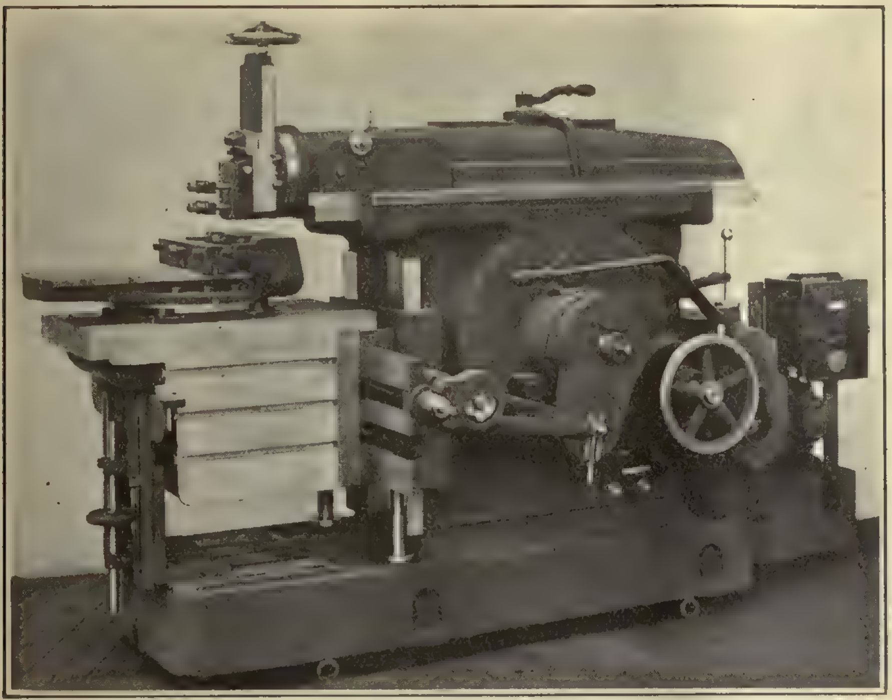
New Heavy-Duty Shaper

AN IMPROVED type of heavy-duty crank shaper has recently been brought out by the Stockbridge Machine Company, Worcester, Mass. Attention has been given in the design of the crank wheel to eliminate overhang and increase its rigidity when operating at long strokes. Additional rigidity is obtained by the use of two bearings, this feature tending to eliminate chattering from gouging of the tools into the work. The bull gear in this shaper is carried between two bearings, the usual hub bearing on one side and the outer support or ring bearing on the opposite side. The outer bearing is on the inside of the column placed close up to the rocker arm and consists of a ring fitting into the column. The full diameter outer journal of the bull gear revolving in the ring bearing is lubricated by means of rollers running in an oil well. Both bull gear and pinion have helical teeth.

The ram is a box section, heavily ribbed with square guides. The wear is taken up by two full-length solid gibs without the use of packing. The gibs are bolted directly to the column, and the ram can be positioned and adjusted to any length of stroke without stopping the machine. Eight ram speeds are provided.

The head has a graduated swivel for setting to any angle and is provided with a clapper box of improved design with planer type solid binding clamp. The clapper has straps and bolts instead of the


SOLID GIBS (NO PACKING USED HERE)
ROCKER ARM CLOSE UP TO RING BEARING
NOTE RING BEARING. BULL GEAR BETWEEN THIS AND HUB BEARING. NO OVERHANG
BULL GEAR WITH HELICAL TEETH
OIL WELL FOR RING BEARING
Section Showing Construction for Bull Wheel



Heavy-Duty Crank Shaper with Single Pulley Drive

usual tool post. The table has two working sides and can be removed easily for clamping work direct to the saddle. The cross feed operates only on the return of the ram and cannot be fed on the strokes. This eliminates breakage. The feed is automatic and can be varied or reversed while the machine is in motion.

The vise is of special construction with a movable jaw, made in halves. Each half is independent of the other. This permits taper or irregular shaped work to be held rigidly. The speed box is of the selective sliding gear type with ball shift. The shaper is driven by a constant speed motor of from 7½ to 10 hp., mounted on an extension of the base. The regular equipment includes a swivel vise, table support and wrenches. Special attachments include an extended circular feeding head, wedge chuck and a boom crane. The shaper has a 32¾-in. stroke and requires a working floor space of 5 ft. x 10 ft. 4 in. The top of the table is 19 in. x 32 in. and has a vertical travel of 15 in. The automatic cross feed of the table is 36 in.

Forced Ventilation for Old Motors

A DEVELOPMENT by which the ratings of old non-ventilated motors can be increased with but a slight increase in weight has been evolved by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and has been applied satisfactorily to a number of types. A ventilating system is applied to old type motors, in which the air is circulated by a fan mounted on an extension of the armature shaft at the commutator end of the motor. There are many non-ventilated motors in electric railway service, which are being continually overloaded, due to more exacting service conditions. The addition of external fans to these motors provides a means for increasing their capacity.

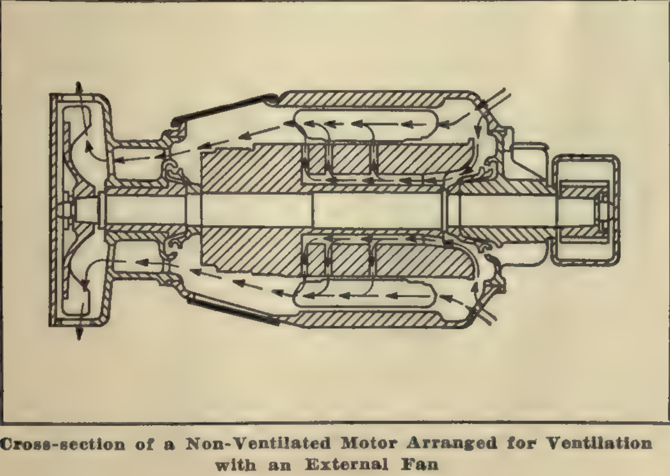
An accompanying cross-section shows the path of the air through the motors. Air is drawn in at the pinion end through openings which must be provided in the motor frame and is then distributed around to the various paths or ducts inside. In a number of the older types of motors, the inspection and hand holes at the pinion end of the frame have been used as air intakes. The air is exhausted by the fan through openings in the periphery of the fan chamber.

As an indication of the increased capacity which may be expected, the accompanying table gives some actual results which have been accomplished by the application of the new ventilating equipment.

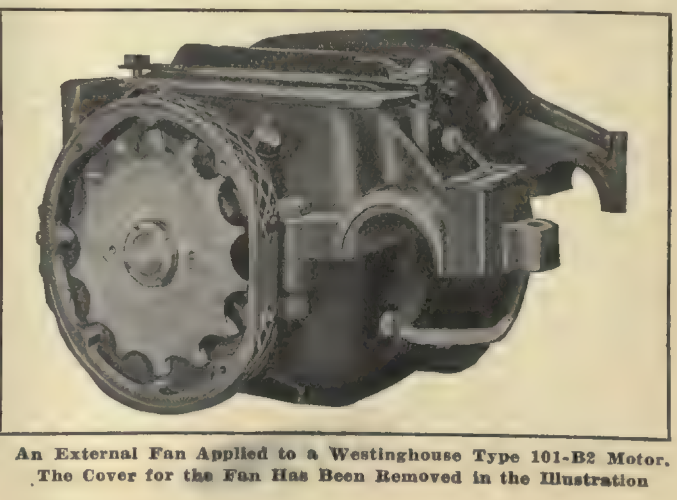
Type of Motor	Per Cent Increase in Continuous Rating at 300 Volts	450 Volts
101-B-2	*20	*38
101 D-2	23	48
306-CA	36	55

*Approximate.

The new parts required for converting a motor of the old type into a ventilated motor include a new shaft with extension for the fan seat; a fan; locking device for the fan; commutator end wiper ring (not always required); new commutator end housing and fan chamber; air intake covers, and commutator end armature bearings (not always required).



Cross-section of a Non-Ventilated Motor Arranged for Ventilation with an External Fan



An External Fan Applied to a Westinghouse Type 101-B2 Motor. The Cover for the Fan Has Been Removed in the Illustration

Association News & Discussions

Outside Factors Affect Damage Claims*

Greater Street Congestion and the Prevalence of Traumatic Hysteria Suggest Greater Care in Accident Investigation

By F. W. Stockmar
Manager St. Louis District,
Railway Audit & Inspection Company

THE normal cost of electric railway damage claims will depend largely on the density of traffic, the condition of the streets and other factors, but will usually run from 1½ per cent to 4½ per cent of the gross receipts, with the average between these two figures. With the increasing use of automobiles, the increasing density of traffic and the increasing carelessness of pedestrians accident claims have become more or less a menace.

Claim Organizations

The usual claim organization consists of a claim agent, who may or may not be a lawyer, and a corps of investigators whose duty it is to run down the claims in the shortest possible time. In addition the legal department usually has one lawyer, whose business it is to keep in constant touch with the claim agent and to prepare and handle such litigation as is brought against the company on account of accident. It is usual to limit the investigator as to the size of the claim he may settle and to also fix a limit for the claim agent. The lawyer in charge of accident and damage suits should also have a fixed limit beyond which he cannot go except by either conference with the general manager or the general manager and the executive committee combined.

Where evidence has to be compiled for contested cases the gathering of this information is usually left to the investigating department, some of whose members may be well trained and others not. There are also investigators who are unable to determine, themselves, what constitutes evidence for the defendant. Their reports may be valuable when the summing up takes place.

Traumatic Hysteria

During the last twenty years there has been a constant increase of "ambulance chasers," who, I am ashamed to say, receive a great deal of help from the medical fraternity in bringing about settlements. Various and sundry internal injuries have been discovered and once the patient's attention is called to this internal trouble—even if it does not exist—the power of suggestion becomes active and the patient immediately is in the grasp of what is now known by both the medical and legal fraternities as "traumatic hysteria." This in its last analysis means only a suggested trouble which becomes such an obsession that its ultimate relief can only be found in a plaster of greenbacks or, in other words, a settlement of the case. Yet "traumatic hysteria" is real. It becomes part and parcel of the patient. I have seen a case where a man wasted away from 225 lb. to 135 lb. and, while the company's attorney and physician were firm in the belief he was faking, there is no doubt in their minds or in mine that had the case not been settled the man would have died.

Women are particularly prone to cases of "traumatic hysteria." The term "anguish of mind, mental suffering, etc.," very promptly plants in a woman's mind the idea that she has been badly used and she is entitled to a settlement and nothing but a settlement will ever relieve the nervous condition in which she finds herself. Therefore, the lawyer and the physician become doubly culpable, first because they are dishonest, and second, because they, perhaps, ruin the nervous system of the patient by their attitude.

In other cases, the outside doctor will double up in the number of visits or dressings of wounds beyond those given to one of his own patients, the answer being he wants to retain his own patient, but any bill against the company is good.

Variation in Statutory Law

In different states the recovery for different classes of accident and even death differs widely. Where an accident incapacitates a man for his daily vocation, his value to the community should be taken into consideration. In an accident on the electrified division of the New York Central some years ago, where there were a number of deaths, the payments for these deaths ran all the way from $10,000 up to as high as $50,000 and more, as there were a number of lawyers and other professional men on this train. A law of this character is pernicious. A man's worth to his family—dead—should be determined by a number of factors, but in the opinion of the writer a bricklayer is as much of an asset to his family as would be a banker, and both families would be entitled to the same consideration.

Again, it should not be the province of the jury to assess the amount of damages to be given in any accident case. Its province should be, "Was the company liable?" If so, the law should specify the amount of settlement, just as an accident policy does.

Many of the so-called "ambulance chasing" lawyers who make a specialty of accident cases are equipped with investigators of their own, whose business it is to get in touch as soon as possible with people who have sustained the injuries and caution them not to talk with the company's investigators or lawyers.

The services of our own company and those of other similar, high-class organizations have been used to run down cases of this character, showing where there was collusion between the lawyer, physician and claimant, where the patient was faking his case, etc. This leads ultimately to the "traumatic hysteria" mentioned, which is one of the most difficult phases of the accident game.

It is easy enough—if the legal department is lax and the investigators careless—to permit a claimant to intrench himself in an almost impregnable position and ultimately to acquire for the company a reputation of being an "easy mark," which once acquired is one of the biggest burdens and liabilities that any company has to bear.

A few years ago there was in this country a corps of athletes who were able to get themselves thrown from the step of a car to the curbstone, and when picked up it would appear that every bone in their bodies was out of joint. In other cases of seeming paralysis needles or pins might be stuck into almost any part of the anatomy without producing the usual reflex, fooling even the company's physician after a long period of time. In one case of this kind the entire lower half of the man appeared to be paralyzed. In an endeavor to show that this was not true, every conceivable test was tried, but the patient was never caught napping. Finally, he was prepared for the operating table and heard the conversation of the attending physicians and every detail of the proposed operation. About the time it became necessary to administer the anæsthetic the patient threw up his hands and admitted that he had been faking all the time, being more scared of the operation than of the needles and pins with which he had been punctured.

In the "traumatic hysteria" case cited above, where the man wasted away from 225 lb. to 135 lb., he invested the money received—some $4,500—in a livery stable, and was sound and hearty within thirty days after the settlement took place.

In the old days we used to figure in the purchasing of a new property that such outstanding litigation as was in the courts for injuries and damages could be settled for 10 per cent of the face value of the suits. I doubt if this could be done now, because the people have grown much wiser.

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*Abstract of paper presented at the annual convention of the Mid-West Claim Agents' Association, Des Moines, Iowa, July 18-19, 1924.

To summarize:

1. Every just claim against the company where liability is recognized by the legal department should be promptly settled and for the lowest amount possible. In the case of a large accident involving a great many people, the faster the company's agents move the smaller will be the ultimate amount involved.

2. The attitude from the general counsel down to the least important investigator in the claim department should be one of "I am from Missouri, you must show me." While it is necessary for the company to have a reputation of being just and fair, it should also be recognized that the company does not propose to disburse money except for such claims as are absolutely just.

3. Careful thought should be given to such claims as may be doubtful but presage large losses, due consideration being given by the claim department to the mental attitude of the trial attorney, who likes to show the largest number of hits and the smallest number of misses.

4. Employ highly trained outside investigators who have made a wide study of cases of this character.

Latest Development in Track Material*

European Companies Are Closely Following Improvements in Rail Manufacture—Three Standard Sections Proposed

BY E. D'HOOP
Chief Engineer Brussels Tramway, Brussels, Belgium

THE discussion on track construction at this convention has been divided into four parts, namely: (1) Track material, (2) track construction, (3) special trackwork, (4) electrical and mechanical operation of switches. It is the first of these subjects which has been assigned to me.

One difficulty with the material in track is that the differences between the requirements of rails for electric railway and for steam railroad service are not realized by the manufacturers. These differences are fundamental. Thus, the general dimensions of the rail in street railway service, and consequently its weight, are not dictated by the stresses imposed upon it, but by the fact that it is in paving of a definite depth and in a street which is used by other vehicles, to whose passage it must present the minimum amount of obstruction. As a rail is surrounded by pavement, joint maintenance is difficult and expensive, and it is subject to the wear of the wheels of miscellaneous vehicles, as well as being often covered by sand, dirt and mud. Then, as compared with steam railroad service, the curves have a shorter radius and have no superelevation, grades are sharper, and there are many points at which maximum braking and acceleration take place.

The duplex rail is going out of use, and there is a tendency in all countries toward standardization on a few sections. The following summary of the conclusions of the Swiss Commission on standardization of rail sections are worth repeating:

"The dimensions in the grooved rail section which most need standardization are the shape of the head of the rail, the diameter of the inside and outside fillet, the distance of the gage line from the center of web, the shape of the sides of the groove, its width, the shape of the bottom of the groove, the height of the guard on a guard rail, and the inclination of the fishing surfaces. The dimensions which are not so important to standardize are the depth of the head, the depth of the groove, the thickness of the web, the total height of the rail and the width of the base. The depth of the head ought to be sufficient to insure a certain vertical wear so as to increase the life of the rail, and there should be a relation between the depth of the groove and the depth of the head, so that as the head wears the wheels will not run on their flanges. The point of contact of the tread of the wheel should be over the rail web.

Based on these conclusions and a study of the existing standard rail sections in France, England and Germany, the writer submits three proposed standards with corresponding guard rail. The principles on which these standards are based are as follows:

1. There are three sections for, respectively, heavy, medium and light service.

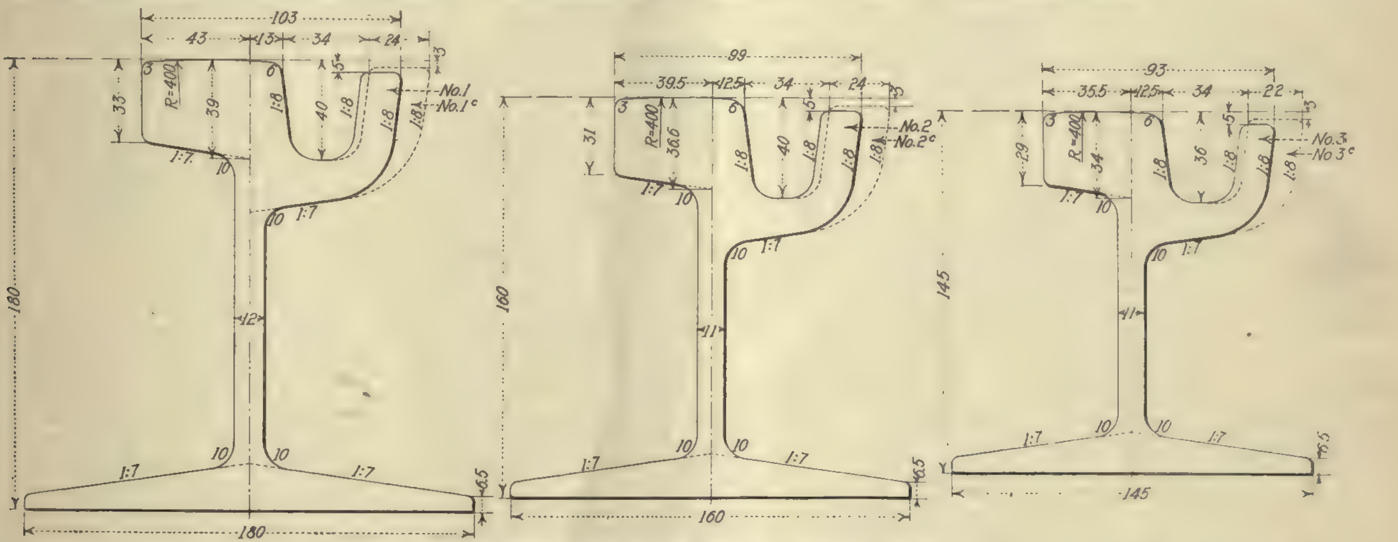
2. The relation of the height to the base is 1.

3. The head is slightly convex, with a radius of 400 mm., so that it will tend to wear flat in normal service.

4. The depth of the head is sufficient to prevent a permanent deformation resulting from the metal exceeding the elastic limit.

5. The radius of the inside fillet of the head is 6 mm.

6. The inclination of the sides of the groove is 1:8. The depth of the groove is 34 mm. measured from the bottom of the inside fillet.



Standard Grooved Rail Sections Proposed at Paris Convention

At left, rail for heavy traffic 180 mm. (7.1 in.) high; in center, rail for medium traffic 160 mm. (6.3 in.) high; at right, rail for light traffic 145 mm. (5.7 in.) high. All dimensions on drawing are in millimeters.

7. The top of the head is 5 mm. higher than the top of the lip in the normal section and 3 mm. in the guard rail.

8. The inclination of the fishing surfaces, both top and bottom, is 1:7.

9. The thickness of the web is uniform, either 12 mm. or 11 mm.

10. The distance between the inside face of the web and the inside face of the head (that is to say, the head side of the groove) is 7 mm. in all sections so as to provide for lateral wear of the groove.

11. The axis of the rail is perpendicular to the plane of the track.

12. The standard length of rail is 18 m.

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*Abstract of report presented at the biennial convention of the Union Internationale de Tramways, de Chemins de fer d'Interet local et de Transports publics automobiles, Paris, June 16-22, 1924.

Practice as to the use of guard rails varies greatly. Some companies bolt a guard lip made of manganese or other alloy steel to the standard rail; others use a regular guard rail, and still others use for the outside of the curve a rail with a shallow groove, so that the wheel will run on its flange.

TABLE OF PROPOSED STANDARD RAIL SECTIONS

No.	Type	Height in Mm.	Height in In.	Weight Kg. per M.	Weight Lb. per Yd.
1	Tangent	180	7.1	56.7	113.4
1c	Guard	180	7.1	59.9	119.8
2	Tangent	160	6.3	49.2	99.4
2c	Guard	160	6.3	52.4	104.8
3	Tangent	145	5.7	41.8	83.6
3c	Guard	145	5.7	44.7	89.4

In general, the companies replying to the data sheet preferred the open hearth to the bessemer process for the manufacture of rails. For carbon content, 0.7 to 0.9 point is considered desirable, though it is not always obtained.

Various processes for the treatment of rails have been developed recently and are as great factors in their wear as the question of composition. They include treatment in the ingot during rolling and after the rail has taken form. Much also has been learned during the last few years in regard to the heat treatment of steel, but of the thirty-eight companies replying to the data sheet only seven stated that they had made any tests with rails which had been heat-treated. Of the heat treatments, the best known is probably the Sandberg, in which the head of the rail after coming from the final roll, and while it is still hot, is cooled by cold air blasts. The same process can be applied to rails in place. A variation has been developed by a French rolling mill, known as the Neuves Maisons process, in which the head of the rail while still hot is treated with water. In practice, the rail is inverted and the head is dipped several times in a water vat.

Most tramway companies purchase their rails on specifications, the specifications providing, among other things, for mechanical tests, chemical tests, and microphotograph examinations. Few companies, however, report making any definite measurements on the wear of their rails in service. Exceptions are the Amsterdam Tramways; the Anglo-Argentine of Buenos Ayres, which uses an apparatus for graphically recording the wear; the Paris Tramways, which employs the Thornton device; the London County Council, which uses a micrometer gage, and the Marseilles tramways. London and Paris report a wear of 0.5 mm. per 2,000,000 ton-km. Marseilles reports that in double track the rails nearer the pavement wear in the ratio of 10 to 6 as compared with those nearer the center of the street.

RAIL JOINTS

The rail joint question has become simplified since the development of the welded joints. The alumino-thermit process is the one most generally used, though arc welding is also employed to some extent.

The ties used are generally of impregnated wood. Metal and concrete ties are not very generally employed.

There is little new to report in tie rods, tie plates, and other accessories.

STANDARDIZATION

Standardization is the order of the day, and tramway companies, which have so many different types of rail, would be the first to benefit through standardization. The international conventions on standardization, held in London April, 1921, and in Zurich, 1923, have contributed notably to the development of standards. The Swiss Standards Association has now decided to establish at its headquarters in Baden a central bureau of information, through which the various standards associations can exchange information and obtain data. This step ought to be of benefit to tramway enterprises.

National Safety Council

THE thirteenth annual convention of the National Safety Council will be held at Louisville, Ky., Sept. 29-Oct. 3.

California Association Executive Board Meets

AT A MEETING of the California Electric Railway Association held on July 7 in San Francisco officers for the year were elected.

The new president is H. A. Mitchell, vice-president and general manager San Francisco-Sacramento Short Line. F. W. Webster, general manager California Traction Company and Fresno Interurban Railway was elected vice-president.

The new executive committee of the association will comprise: Paul Shoup, vice-president Southern Pacific Railroad; President H. A. Mitchell; W. R. Alberger, vice-president and general manager Key System Transit Company; Claus Spreckels, vice-president and general manager San Diego Electric Railway; Colonel Charles N. Black, president Market Street Railway, San Francisco, and W. E. Dunn, president Los Angeles Electric Railway.

A new publicity committee was appointed, consisting of M. McCants, Ben S. Allen, R. E. Kelly, R. E. Fisher, J. G. Jeffery and E. C. Thomas.

American Association News

Handbooks on City and Interurban Operation Prepared

IN CONNECTION with the work of the committees on city operation and interurban operation a "handbook of modern methods" has been prepared for each. These handbooks, to which reference has been made previously, and which were described quite fully in an article by R. F. Carbutt, published in this paper June 21, page 987, have now been prepared in tentative form and distributed to all members of the two committees for review and comments at the meetings to be held at the Missouri Athletic Club in St. Louis on July 25.

These handbooks are prepared from contributions by men in charge of various activities in the city and interurban electric railways throughout the country. In general, not more than one typewritten page is devoted to each item, so that the treatment of the subject is not by any means in the form of a detailed committee report. While the detailed descriptions of modern methods are short, they are designed to be complete enough to convey the reasons for the adoption of the method, the results obtained and information as to where full details may be secured.

In order that these concise reports of modern methods might be arranged in a manner such that any subject would be readily available when desired, the form of subject index of the ELECTRIC RAILWAY JOURNAL has been adopted.

The scope of the activities of the committees is very broad as the objective was a general survey of the modern methods in use in the industry. Executives of the properties visited were asked for information on any modern methods they were using. The regional vice-chairmen frequently were asked for suggestions of subjects that would be of interest to other operators; therefore, the following list was prepared based partly on conversations with street railway executives and partly on suggestions from the editors of *Aera*, the ELECTRIC RAILWAY JOURNAL, and *Electric Traction:*

A. Securing public good will.

B. Refinancing plans reducing the cost of new capital; distribution of securities among customers and employees, and other methods of obtaining money for needed improvements.

C. Developing good relations between management and employees.

D. Training of personnel, including safety education.

E. The solution of the city traffic congestion problems.

F. Co-ordination of electric street railway and motor bus service for all transportation requirements and relief from unfair competition.

G. Popularizing electric railway service.

H. Modernizing and developing attractive rolling stock.

I. Providing facilities for maintaining equipment efficiently.

J. Economies in operating and maintenance practice.

K. Improvements in construction practice resulting in reduced first cost, reduced maintenance and improved reliability of service.

L. The installation of automatic substations and other power economies.

M. Relief from paving burdens and other imposts.

Annual Convention
and Exhibits
A. E. R. A
Atlantic City, N. J.
October 6, 7, 8, 9, 10

The News of the Industry

Power Being Conserved

Los Angeles Properties Carrying Out Instructions of Commission—Many Stops Eliminated—No Reduction in Rush-Hour Service

Due to the shortage of hydro-electric power in California this summer caused by the light rains of last winter, the Los Angeles Railway is carrying out an extensive program for power conservation along lines authorized by the State Railroad Commission and the Los Angeles Board of Public Utilities.

The first step in the program was the elimination of a large number of stops and the relocation of others. On some of the lines shuttle service is being given at the terminals, particularly in hill territory. There has been very little reduction of morning and evening rush-hour service, but headways have been extended in the midday and night period.

A thorough campaign is being conducted among trainmen teaching motormen how to save the greatest amount of power at the controller and instructing conductors to conserve lights and cut down the time of stops to a minimum.

The Los Angeles Railway has also filed application for operation of a new bus line extending south from the business district, and further rearrangement of the bus facilities is being planned to meet the emergency.

Newspaper advertising space, posters and cards in the cars and "Azuride," the company publication, are being used extensively to acquaint passengers with the necessary changes in service.

In its curtailment and rehabilitation plan due to the power emergency, the Pacific Electric Railway proposed a reduction of local car service to the extent of approximately 51,000 car-miles per month, or about 2½ per cent of the total mileage. The company has turned two of its unused steam power plants over temporarily to the Southern California Edison Company, which has rehabilitated the plants for operation as an emergency measure during the power shortage period.

The cut of mileage was made effective July 7 and involved the rearranging of schedules, resorting to the wartime skip-stop method of operation and reducing or eliminating entirely car runs on lines subject to light travel.

The Pacific Electric officials state that the interurban main-line traffic will not be subject to major changes, but on these lines unused cars will be turned back before reaching the end of the line, while three and four-car trains will be cut down to one car. Light traffic local car lines of the Pacific Electric in Pomona, Redlands, Riverside and Long Beach will be eliminated.

General reduction in service will be on the "off-peak" hours and at night. In some districts where car service is eliminated it is proposed to take care of the public with buses.

In Los Angeles local service shuttle runs have been started by the Los Angeles Railway on some of its lines, while it is intended that twenty-one double-deck buses now pending delivery will shortly be placed in service to give relief to the reduced car schedules.

The two traction lines in Los Angeles filed an application with the State Railroad Commission for permission to reduce their schedules in conformity with the commission's order for a 25 per cent reduction in power consumption. The Los Angeles Board of Public Utilities also is conducting a survey for a 25 per cent power-saving plan to be approved by the board in conjunction with the commission's order.

Another Trackless Trolley on Staten Island

A fourth trackless trolley line has been opened by the city of New York on Staten Island. It runs from Meier's Corners, West New Brighton, to Tipperary Corners, New Dorp, via Bradley Avenue, Brielle Avenue and Rockland Avenue.

Meier's Corners is the terminus of the Linoleumville and Sea View Hospital trackless lines, which have been in operation since the fall of 1921, and is on the Silver Lake and Concord Municipal trolley lines. Tipperary Corners is in New Dorp on the line from St. George to Richmond.

Purchase of Bus Line in Interest of City Proposed

An ordinance providing for the purchase of the property of the Detroit Bus Company by the city in behalf of the municipal railway will be submitted to the electors next fall. Announcement to this effect was made by officials of the Department of Street Railways during a hearing before the City Council on the bus company's proposal to establish a new major route running from Fourteenth and Longfellow Avenues in the residential section to the site of the new Book-Cadillac Hotel on down-town Michigan Avenue. The Street Railway Commission is making a survey of the bus company's activities and a report is expected to be submitted to the acting Mayor recommending that the purchase proposal be placed on the ballot. The railway management is understood to regard the proposed new bus route as an extra and unnecessary form of transportation which would take from the railway certain revenues needed to assist in financing extensions.

Bus Company States Plans

Newly Organized Company Conducting Traffic Surveys in Seven Cities—Prepared to Co-operate with Railways

A nation-wide system of urban and interurban motor buses, radiating from virtually all important cities, supplementing or partially replacing electric railways or steam railroads, is the plan of the recently formed Omnibus Corporation of America. Announcement to this effect was made on July 15 by John Hertz and John A. Ritchie, chairman of the board of directors and president, respectively, of the new company. Mr. Ritchie said:

> Buses are the most modern and most economical means of transportation, and as such should be used to the greatest advantage either in replacing existing systems or as auxiliaries. There is a great need for this form of rapid transit in both city and country and the people are going to demand its adoption. We are entering this field with a broad vision, confident that a few years will see the Omnibus Corporation owning wholly or in part companies throughout the United States.

The Omnibus Corporation officials do not subscribe to the theory that the day of the trolley is ended, but they do believe that there are many cities lacking transportation facilities in certain sections that could well utilize auxiliary bus service. While it would not be profitable in many cases for the electric railways to lay track and put in power plants to provide transportation, the bus will enable profitable expansion, according to the Omnibus Corporation officials.

Seven surveys are now being made in various cities to determine the feasibility of bus service, according to Mr. Hertz. In each of these cases the bus corporation is undertaking the investigation with the co-operation of the local traction interests. Two of these companies have accepted the results of the survey, showing the part that buses can profitably take in providing additional and substitute transportation, and plans are going ahead for the formation of companies.

One company has already been formed and an application for a franchise has been filed, but details will be lacking for several weeks. This company will be owned half by the Omnibus Corporation and half by the traction interests, which operate a widespread interurban service. Buses will operate between two of the principal cities of the United States approximately 300 miles apart, and there will be several subsidiary lines running to neighboring towns and cities.

In discussing the formation of this company, Mr. Hertz, who will not reveal the name for several weeks, said that it is only one of many that may be started within the next few years. A uniform policy of divided control between the Omnibus Corporation and the local traction interests will be adopted. Mr. Hertz said:

> We are prepared to co-operate with electric railway operators or steam railroad companies in the formation of the bus or omnibus lines. As many of the traction companies lack credit or confidence, the Omnibus Corporation will provide whatever part of the capital is necessary to start these companies. We will assume a one-fourth, a half or three-quarters ownership and start the companies in operation. We have enough confidence in the future of this new industry to match our capital against that of local interests, and we will provide the enterprise, the energy and the operating experience necessary to make such companies a success.

Existing transportation needs and facilities were briefly sketched by Mr. Ritchie in discussing the future of the bus. He said:

> We are at the point of a new era in distribution. The old methods have failed to meet the requirements of our expansion. There are at present four basic means of distribution.
>
> The first, the steam railroads, with 260,000 miles of lines, definitely limited because of lack of terminal facilities.
>
> The second means of transportation is the street railways. With only 48,000 miles now in operation, they have not expanded, but, on the contrary, have abandoned much trackage since 1917.
>
> The third, the waterways, has decreased in importance in regard to passenger traffic, but because of the inadequacy of the railroads have increased in freight hauling.
>
> The remaining means of transportation, the highways, is the as yet undeveloped hope of the future. There are now in the United States 1,400,000 miles of highway, of which only 36,000 miles are improved. Farmer resistance, which has heretofore obstructed progressive improvement programs, has disappeared. The $11,400,000,000 appropriations of federal and state governments in 1923 are evidence of the development to be expected in highway transportation in the future.
>
> Organized freight and passenger distribution over the unlimited highways of the city and country is fast becoming of tremendous importance. It is the idea of the Omnibus Corporation to be in a position to meet this growing need. With a practical monopoly of experience in bus operation and an absolute monopoly in double-deck bus operation, the new company offers its facilities and financial standing to the struggling transportation systems now trying to meet modern requirements with obsolete equipment.

The Omnibus Corporation is formed of the Chicago Motor Coach, Fifth Avenue Bus and the New York Transportation Companies, which were merged some weeks ago, with a capitalization of $40,000,000 authorized. About $16,000,000 was required for the exchange of securities, leaving the remaining $24,000,000 of capital available for investment in bus systems throughout the United States.

Shipments of Hogs at Indianapolis Grow

It is predicted by Samuel E. Rauh, president of the Belt Railroad & Stockyards Company, Indianapolis, Ind., that within the next three years the interurban electric railways will be hauling three-fourths of the livestock coming into the Indianapolis market, which, in the hog department, is one of the largest in the country.

The increase in the number of cars handled by the interurban roads in five years is 817 per cent in this market. Most of the traffic is inbound shipments, but the outbound division is now also showing large gains. In 1919 only eight cars were outbound, while in 1923 the number increased to 1,086.

Gasoline Cars Will Replace Trolley

Plans are being made to rehabilitate part of the system of the Jersey Central Traction Company, Keyport, N. J., which suspended operations some time ago. The section to be reclaimed lies between Red Bank and Keyport, a distance of 18 miles. In order to carry out the project the Red Bank & Keyport Railway has been incorporated with an authorized capital stock of $250,000, but it is not expected that more than half of this amount will be needed to rehabilitate the road, supply new equipment and furnish necessary working capital. The incorporators of the new company are: Herman E. Schlicting, Red Bank, N. J.; M. M. Zimmerman, 342 Madison Avenue, New York City, and Julius Weiss, New York. Mr. Zimmerman will be vice-president and general manager in charge of operations.

It is not proposed to restore service by trolley, but to equip the line at the start with six gasoline motor cars to be built by the Edwards Railway Motor Car Company, Sanford, N. C. The intention is to supply a twenty-minute to a thirty-minute headway and to divide the road into zones with unit fares of 5 cents each. So far as possible the zone areas will be made to coincide with the business districts of the towns through which the road will operate. The cars to be used are now under construction and it is expected that the rehabilitation of the road will be sufficiently well along to permit restoration of service by Oct. 1. The gasoline car which will be used will be similar in design to other cars of the kind supplied by the Edwards Railway Motor Car Company to the Baltimore & Ohio, Chicago, Burlington & Quincy, Cape Fear Railways, Washington & Lincolnton Railroad and other systems for branch line use. They will be all steel in construction and seat forty passengers each. It is expected that they will be able to operate 8 miles per gallon of gasoline consumed. The former Jersey Central Traction Company operated 40 miles of electric railway. It was controlled by the American Railways, now the American Electric Power Company.

Key System Operating Buses in Alameda

In accordance with an order issued by the State Railroad Commission and with the approval of the Alameda City Council, the Key System Transit Company on July 10 started regular bus service in Alameda with two Fageol safety coaches, operating as feeders to the electric lines, to which the buses transfer.

This operation is the forerunner of a new Key System policy which will be applied to other East Bay cities in the course of time. These cities are growing faster than it is possible to supply railway extensions and it is hoped to solve the problem by the operation of buses.

Up to the time of the experiment by Oakland officials in municipal bus operation it seemed likely that the railway was in for keen rivalry. The "Rosalie," operated by Commissioner Moorehead for the city for five months, showed a deficit at the end of that time, figuring wear and tear and overhead expenses.

Ben Allen for the Key System Transit Company has stated that while the company has no intention of establishing permanent bus lines, it has been deemed advisable to use this mode of transportation on feeder lines in outlying districts. The buses will be replaced just as soon as the construction of railway extensions can be made profitable.

$8,000,000 Subway Expenditure Recommended in New York

The Board of Transportation of New York City at its regular meeting on July 15 adopted a resolution recommending to the Board of Estimate the route it approves for the further extension of the Fourteenth Street-Eastern District subway. This is the first important constructive action taken by the board, of which Commissioner John H. Delaney is the head.

The route adopted is essentially the same as that for which the Mayor and the Board of Estimate have expressed a preference. The proposed new link will add a little more than 2 miles to the 4 miles which are already completed and through which trains are operating regularly between Sixth Avenue and Fourteenth Street, Manhattan, and the present eastern terminal at Montrose Avenue, Brooklyn.

The new link's construction, it is estimated, will add approximately $8,000,000 to the $15,700,000 already expended for the completed part of the line. This estimate does not include interest during construction, cost of superintendence or the cost of equipment.

Question of Operation of Stub Line in Syracuse Held Over

The hearing before the Public Service Commission on order directed against the Syracuse & Suburban Railroad, Syracuse, N. Y., to show cause for failure to operate a stub line in Syracuse was adjourned until Sept. 10 at Albany. Commissioner William R. Pooley suggested that the railroad institute abandonment proceedings in order to clear the matter on the records of the commission.

The controversy hinges on a misunderstanding as to ownership of the East Fayette Street stub, the Syracuse & Eastern Railway contending this part of line was not taken over in the reorganization of the Syracuse & Suburban Railroad and the commission holding that the inclusion of the stub line was stipulated by the commission in its approval of the reorganization. Commissioner Pooley denied a motion of Attorney Hartmann for dismissal of the proceedings, stating that the matter must be closed either by change to abandonment proceedings or by compliance with the order to resume service. Mr. Baker, speaking for the petitioner and the city, stated he did not wish to interfere with the contemplated bus line service, and if such service could be had the people would be satisfied.

Ohio Governor Calls Grade Crossing Safety Conference

The Governor of Ohio has called a special conference to be held in Columbus on July 23 to formulate plans for the reduction of grade crossing accidents in the State. Representatives of steam and electric railways, motor transportation organizations and others interested in decreasing crossing accidents have been invited. A program is being prepared by a committee acting under the Director of Commerce of the state.

The proclamation points out that during the year 1923 there were 157 automobile accidents at grade crossings in Ohio, in which 235 persons were killed and 729 injured. It is further pointed out that there were 1,235 deaths and 6,180 persons injured in the State in automobile accidents in general.

The State has an added interest in the matter on account of the development of the rural school system, and the transportation of a large number of school children in automotive vehicles.

De Luxe Suburban Service by Bus for Rochester

The East Avenue Bus Company, controlled by the New York State Railways, has applied for a permit to operate a de luxe bus service from the business section of Rochester, N. Y., to the exclusive Browncroft subdivision, on the outskirts of the city. If the action of the Common Council is favorable, operation may start on Sept. 1. The fare will be 25 cents and the application states that parlor cars of sixteen-passenger capacity will be used.

The application is made on the solicitation of Browncroft residents for a high-class transportation service. The East Avenue Bus Company, absorbed about three months ago by the railway, also operates over East Avenue, Rochester's exclusive shopping and residential thoroughfare, from the business center to the suburb of Pittsford, a distance of about 8 miles.

More Trouble in Hornell

The Common Council of Hornell, N. Y., will decide on July 21 whether or not a franchise will be granted for the operation of buses. The Hornell Traction Company is fighting the bus projects. For the past few months Raymond E. Page has been operating the railway through his appointment as receiver.

Clyde G. Abernathy, who operates a bus line between Hornell and Rochester, is now seeking permission to operate a line between Hornell and Arkport. This would serve the residents of North Hornell, the traction company having abandoned car service to that suburb because it did not pay. He is also ready to operate bus lines throughout the city if allowed.

At the preliminary hearing on his application, Fred A. Robins, former mayor, appeared before the aldermen and urged that the petition be denied on the grounds that it would mean an end to street car service. He said the company is fighting a hard battle and had been forced to abandon its North Hornell line because of lack of revenue and because a new bridge, costing at least $15,000, would have to be built if the line were continued.

Iowa Company Seeks Restraining Order

A fight waged by the Omaha & Council Bluffs Street Railway to increase fares in Council Bluffs, Iowa, was carried into federal court when the company filed a suit against the city asking a temporary writ of injunction and restraining order enjoining the defendant from preventing the collection of higher fares on the various local lines. The company asks the court to approve the new rates as proposed by the plaintiff and to adjudge the present fares non-compensatory or too low to give a fair return. An injunction is sought to restrain the city from canceling the company's franchise and from interfering in the operation of the system under the proposed new rate of fares.

New fares proposed by the company are as follows: Seven cents for adults or four tickets for 25 cents, 3 cents for children, 5 cents for school tickets; cash fare between Omaha and Council Bluffs to remain the same, tickets at 6⅔ cents each, adult fare between Council Bluffs and the school for the deaf 7½ cents, children 5 cents, round-trip fare between Omaha and deaf school 25 cents.

The new schedule of fares would give the company an estimated increased income of $95,357 or a total return of $652,938. This would amount to approximately 50 per cent of the deficit in earned income for 1923, the petition sets out.

For 1924 the company declares the income shows a gradual decrease while the expense remains practically the same. For the first five months of this year fewer passengers were carried than for the similar period of the last three years, it is stated.

Figuring a 7 per cent return on invested capital the company asserts it has sustained the following deficits in earned income for the preceding years: 1921, $206,366; 1922, $168,444; 1923, $178,441.

Fare Posters in Brooklyn Cars Provoke Widespread Opinions

Patrons of the Brooklyn-Manhattan Transit Company, Brooklyn, N. Y., were attracted to new posters in the cars on July 14 under the caption "Look Ahead" and "Are Public Servants Worthy of Their Hire?" The message read as follows:

> In more than 545 cities transit fares range from 6 to 10 cents, because transit service today costs more than it did in 1913. Adequate service cannot be maintained without adequate fare.
>
> By authorizing a 20 per cent increase in fare on the New York and Queens County Railways Company, the Transit Commission followed the same fundamental principle followed by Mayor Hylan when his salary was increased 66 per cent on May 23, 1923. A public servant transit company is as worthy of its hire as a public servant in any public office.

Fleet of Forty-three Motor Coaches for Interurban

Thirteen new motor coaches have been placed in service by the Chicago, North Shore & Milwaukee Railroad in the last two months, giving the company at the present time a fleet of forty-three motor coaches of the most approved type.

A motor coach line running from Waukegan to McHenry and Woodstock will be put into operation within a few weeks, according to present expectations. Authority to operate the line was granted more than a year ago by the Illinois Commerce Commission, and ordinances were passed by the various villages, but the installation of the line has been delayed on account of the condition of the roads. The last section of the cement roadway is expected to be open for traffic in August.

Two-Year Wage Contract in New Orleans

Three thousand employees of the New Orleans Public Service, Inc., including 1,500 men in the railway department, have signed a two-year contract with the company. The men will receive the same wage as formerly, but the railway men get an eight-hour day instead of a nine, with an adjusted compensation that will make the wage disbursement about the same as it now is. Following is the scale of wages:

> Motormen and conductors of more than twelve months' experience 51 cents an hour, the old rate, with 5 cents an hour extra for operators of one-man cars. Pitmen 59 to 63 cents an hour, helpers 46 cents, dopers 45 cents, washers and other helpers 35 cents, maintenance men from 30 cents for track laborers to 60 cents for pavers. Employees of the gas company on an hourly basis will receive from 30 cents an hour for helpers up to 70 cents an hour for special utility men.

News Notes

Fare Application Amended. — An amendment to its application for an increase in fare has been filed with the Cincinnati Council's committee on street railroads by the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad. This amendment will allow the purchase of tickets at a rate of 7½ cents each, in strips of six for 45 cents, and a cash fare of 10 cents. The original application called for a cash fare of 10 cents without tickets. It was filed with the committee a month ago.

Fare Increase Not in Effect.—Officials of the Springfield Street Railway, Springfield, Mass., want to clear up an erroneous impression held by the general public with respect to a new schedule of 10-cent fares. They state that no fare increase has been put into effect and that the only step in that direction has been a study of the advisability of asking permission to increase fares. Widespread discussion of the matter in the daily papers, none too intelligently directed, had resulted in part of the public taking the increase for granted and tendering the extra money in payment of fare.

Van Loan Corporation to Dispose of Property.—Irving S. Van Loan Corporation, New York, has entered into a contract with Receiver W. G. Meloon of the Portsmouth, Dover & York Street Railway, Portsmouth, N. H., to dismantle and dispose of 45 miles of railway. The deal also includes the powerhouse, substation, cars and equipment. The agreement has been signed and approved by the court.

Competing Bus Operation Allowed.—Permission for the operation of four large buses over the Sixth Avenue car route in Tacoma, Wash., in competition with the Tacoma Railway & Power Company's cars, has been granted by the City Council on recommendation of Mayor A. V. Fawcett. The move was the Mayor's answer to the proposed new franchise submitted by Richard T. Sullivan, manager of the railway, which did not meet with the approval of the Mayor. The Council voted unanimously for the bus permits. The buses will operate on a 5-cent fare, with eighteen hours of service, starting at 6 a.m., at fifteen-minute intervals.

Railway to Expand Trucking Service.—The Detroit United Railway, Detroit, Mich., will establish passenger, freight and express service by automobile in the "Thumb" district of Michigan as a feeder for its electric railway lines. This will be the second freight and express motor truck service established by the company. The first line, between Jackson, Hillsdale, Coldwater and Sturgis, has been in successful operation almost a year. Application for permission to operate motor vehicles in the new service has been made to the State Public Utilities Commission through the Detroit United Railway Trucking Company, a subsidiary. As in the case of the present service, it is planned to develop special trucks with demountable bodies or containers which can be transferred direct to the electric cars.

Debt to Be Wiped Out.—In less than a month the compromise deal will be completed by which the city of Tacoma, Wash., will free its municipal car line of the debt to the Emergency Fleet Corporation incurred during war days. Under the procedure of the Shipping Board the agreement must be prepared by a special department, approved by the Attorney-General, sent to Tacoma for official signature, returned to Washington for signature, then returned to a Tacoma bank in escrow to await the payment of the $115,000 agreed upon as settlement. Later, the suit filed in the United States Court at Tacoma will be dismissed by joint city and government request.

Rates Reduced to Stimulate Business.—The Kansas City, Kaw Valley & Western Railway, Kansas City, Mo., has filed a new schedule of passenger fares for all points between Kansas City, Kan., and Lawrence with the Public Utility Commission of Kansas. The new fares suggested by the company provide a material reduction for round trip charges and for special car and party rates. The ten-ride commutation ticket still stands at five times the full fare. The forty-ride commutation ticket is to be sold at 25 per cent off the full round trip fare and there is to be a three-day excursion ticket sold at 30 per cent below the full round trip fare. The company announced to the commission that it desired to establish the low round trip and special party and special car fares as a means of increasing passenger traffic.

New York Body Puts Off Hearing.—A further adjournment of one week, to July 23, was granted by the Public Service Commission in the petition of the Poughkeepsie & Wappingers Falls Railway for permission to increase its fares. The hearing was to have been held July 16, but the railway company said it would not be prepared to go on with the case at that date.

Trackless Trolleys Discussed.—Mayor Hackett, members of the Board of Contract and Supply and the Board of Estimate conferred recently with representatives of the United Traction Company, Albany, N. Y., and the Westland Hills and Country Club Associations relative to trackless trolleys in Western Avenue west of Manning Boulevard. No decision was reached. Residents want either the trackless trolleys or the trolley tracks moved to the center of the street. The traction company operates over its own private right-of-way and does not wish to pay for the paving between the tracks and for 2 ft. outside as it would have to do if the tracks were moved.

Bus in Mail Service.—An opportunity has been presented to certain bus lines operating in Wisconsin to add to their revenues by transporting United States mail from one city to another where the railroad connecting cities has cut its service due to lack of patronage. Mail for Albany, Monticello and New Glarus will come as far as Monroe and Brodhead by rail, from which cities final delivery will be made by bus.

Safety Work to Be Discontinued.—The Safety Council at Washington, D. C., was dissolved recently by a vote of its executive committee because the public of Washington was "unwilling to contribute sufficient moral and financial support to this great movement." This was the belief of the members borne out in a statement issued by W. Graham Cole, secretary of the council that a small group of public-spirited men had supported the work of the council at great financial expense to themselves and loss of time for nearly two years. Further, that the many people who had profited by the activities of the council had ignored appeals for help. The statement also said that the painting of white lines at street intersections, organization of junior safety councils in schools and the teaching of fire-prevention in private families would be abandoned.

One-Man Cars Allowed.—The Public Utilities Commission of Idaho has authorized the Boise Valley Traction Company to put into service one-man cars on the South Boise line and to equip them with proper and adequate safety devices for a trial period of sixty days. The commission's order stated that the system as a whole had not been earning operating expenses and fixed charges and that the public convenience and necessity required the curtailment of expenses. The company applied on May 14 for permission to make the change to one-man cars. A protest was filed and the commission set the case for later hearing.

Franchise Passed in Alton.—The City Council of Alton, Ill., on July 10 passed an ordinance granting franchises to the Alton, Granite & St. Louis Traction Company to continue to operate cars in that city. A clause of the new ordinance provides that with the acceptance of the franchise the company agrees to pay an annual tax of $25 a car operated and will also construct a second track on the City Hall Square. Officials of the company have not stated whether they would accept the ordinance.

Planning Single-End Cars.—The Grand Rapids Railway, Grand Rapids, Mich., is planning to replace all cars with single-end type cars. City Manager Locke has asked the administrative committee of the City Commission to permit the company to use certain city-owned lots on which to build a rail loop in order that the cars may turn upon arrival at the terminal.

Will Run One-Man Cars.—At a recent special meeting of the City Council of Danville, Va., the franchise of the Danville Traction & Power Company was amended so as to permit the use of one-man cars. The question of one-man car operation has been pending for some time, use of the one-man cars being urged because of the serious decline in patronage. The matter was referred to previously in the ELECTRIC RAILWAY JOURNAL.

Bus Regulatory Bill Before Legislature.—The motor bus bill pending in the Georgia Legislature appears likely to pass. The bill provides that the bus lines be placed under the Public Service Commission for supervision. At present the bus lines are regulated by city ordinances, state statutes, county laws and even interstate laws.

Belt Line Proposed.—The Cincinnati, Newport & Covington Railway is negotiating with merchants to establish a belt line of Green Line cars between Ludlow and the various business sections of Covington, Ky. If the present proposed deal for a belt line is effective, merchants say that an effort will be made to have the company establish other belt lines which will bring the outlying districts into closer touch with the mercantile section of Covington.

Eighteen-Cent Rate Reasonable.—Dismissing a petition of a reduction in trolley fare between Camden and Maple Shade, the Board of Public Utility Commissioners of New Jersey held that the 18-cent fare now charged by the Public Service Railway is neither unreasonable nor discriminatory, as alleged in the complaint. The petition pointed out that between Haddonfield and Camden, both of which towns are approximately an equal distance from Camden, the fare was 10 cents, while residents of Maple Shade were called upon to meet the higher fare. The Public Service Railway answered the argument with testimony showing a greater traffic density in the communities paying the lower fare.

Financial and Corporate

Protective Committee for Interurban

Bonner Springs Line Will Pay Aug. 1 Interest, but Has Been Unable to Renew Loan

The financial depression in the Middle West during the last year, especially among the farmers, together with the increase in the use of the automobile, particularly the bus, has not been without effect upon the Kansas City, Kaw Valley & Western Railway, a 40-mile line which operates between Kansas City and Lawrence. In consequence a situation has been created with respect to the affairs of the company which will take time to work out. It is believed that the future business of this line will tend more toward the handling of freight than the transportation of passengers. With the growth of Bonner Springs and the development of the cement plant more business will accrue to the Kaw Valley line. With the almost phenomenal growth of Kansas City, Kan., the population of which is now more than 100,000, and the resultant development of all kinds of business, it is felt that the prosperity of the Kaw Valley will be assured.

Col. Karl D. Klemm, president of the company, feels the company is suffering from deflation that is temporary. He has explained that it will be impossible to pay off funded obligations due on Aug. 1, but that the interest on the first mortgage bonds, will be deposited with the trustee. He says that although passenger business has fallen off the freight business has held its own, even though there has been a business depression. A condensed earnings statement for the ten years of the existence of the company, as made public by Mr. Klemm, follows:

	Gross Earnings	Operating Expenses	Taxes	Net Earnings‡
1914*...	$29,221	$11,701	$185	$17,335
1915....	51,194	28,676	2,112	20,406
1916....	152,959	85,978	2,535	64,445
1917....	221,607	136,087	11,082	74,437
1918....	246,474	159,200	10,057	77 216
1919....	337,545	216,721	12,561	108,263
1920....	469,771	326,944	18,272	124,554
1921....	475,224	293,770	23,964	157,489
1922....	468,903	292,465	19,610	156,826
1923....	461,819	312,398	21,515	127,904
1924†...	148,634	123,569	8,500	16,565

*Six months. †Five months. ‡Before depreciation.

Mr. Klemm says that one of the largest contributing elements to the increase in operating cost has been the mounting burden of taxation. This it has been impossible to combat, although efforts have been made from year to year to persuade the taxing authorities to keep the increases within reason. Mr. Klemm is convinced that the future prospects of the property are bright, if proper legislation is enacted to regulate bus operation or if suitable means can be devised to combat this bus competition. The freight business has shown a continuous increase, and the largest individual shipper, namely, the Kansas Portland Cement Company's plant at Bonner Springs, is at present being enlarged to three times its present capacity. Mr. Klemm also has called attention to the fact that the Kansas City, Kaw Valley & Western Railway has the opportunity of acquiring a half interest in the Kansas & Missouri Railway & Terminal Company, a terminal belt line with some 10 miles of track, located in Kansas City, Kan., running through the center of the most rapidly growing district in that city. This line will be a great producer of freight for all connecting railroads in Kansas City, and its acquisition is considered of the utmost importance for the future of the Kaw Valley property.

A meeting was held July 10, called by Channing Folsom, of Folsom, Wheeler & Company, for the bondholders. Mr. Folsom's company sold some of the bonds locally and he started an investigation about six months ago in the interest of his clients. A protective committee has been selected by Otis & Company, with Mr. Folsom as one of the members.

Seattle Net Income $600,000 Less

Disastrous Results of 5-Cent Fare Pledge Shown in Reduced Revenue of Municipal Line for 1923—Much Greater Use of One-Man Cars Prevents Deficit for Year

THE story of a costly experiment in adjusting fares to suit political expediency is told in the annual report of the Seattle Municipal Street Railway Department for the year ended Dec. 31, 1923, presented to the Mayor and the City Council by D. W. Henderson, general superintendent of railways.

Save for the formal letters of transmittal included, the report consists entirely of statistics, the chronology being the only statement not given in tabular or chart form. The significant events in the chronology, however, are given in the statement of rates of fare, of which the following is a summary:

RATES OF FARE

May 9, 1914—Cash, 5 cents; 6 tickets for 25 cents; 25 tickets for $1. Extra fare required on Lake Burien line outside city limits, or 16 tickets for $1 good for full trip.

April 1, 1919—4 1/6-cent and 6¼-cent tickets eliminated.

July 24, 1920—Cash fare, 10 cents. Token fare, 6¼ cents.

Jan. 9, 1921—Cash fare, 10 cents. Token fare, 8⅓ cents.

CONDENSED STATISTICAL AND COMPARATIVE REPORT OF OPERATION, SEATTLE MUNICIPAL STREET RAILWAY—1923

	Current Year			Previous Year		
Revenue—Operating	Amount	Per Car-Mile (Cts.)	Per Car-Hour (Cts.)	Amount	Per Car-Mile (Cts.)	Per Car-Hour (Cts.)
Passenger car revenue	$5,613,545	34.70	318.43	$6,130,729	39.64	366.19
Special passenger car revenue	651	0	.04	1,006	.01	.06
Automobile bus revenue	29,543	.18	1.68	28,094	.18	1.68
Municipal department passenger revenue	48,000	.30	2.72	50,000	.32	2.99
Freight revenue	36,510	.23	2.07	43,152	.28	2.58
Mail revenue	17,643	.11	1.00	18,839	.12	1.13
Miscellaneous transportation revenue	....	.....	......	1	.00	.00
Discounts and adjustments	55,295	.34	3.14	55,253	.35	3.31
Total operating revenue	$5,690,598	35.18	322.80	$6,216,569	40.20	371.32
Miscellaneous Revenues and Expenses						
General shops	*38,162*	*.24*	*2.16*	*$38,780*	*.25*	*2.32*
Service equipment	*13,388*	*.08*	*.76*	*1,357*	*.01*	*.08*
Utility equipment	*605*	*0*	*.03*	*1,846*	*.01*	*.11*
Electric current sold	464	0	.03	1,115	.01	.07
Rental of real estate and buildings	4,213	.03	.24	6,158	.04	.37
Rental of tracks and way facilities	24,563	.15	1.37	23,124	.14	1.37
Rental of transportation equipment	1,383	.01	.08	3,363	.02	.20
Station and car privileges	18,162	.11	1.03	18,212	.12	1.09
Lost and found department	*207*	*0*	*.01*	*139*	*.00*	*.01*
Other miscellaneous revenues and expenses	2,763	.02	.16	1,682	.01	.10
Total miscellaneous revenue	*813*	*0*	*.05*	11,533	.07	.68
Total gross revenues	$5,689,784	35.18	322.75	$6,228,102	40.27	372.00
Summary of Operation						
Way and structures	$ 411,365	2.54	23.33	382,805	2.48	22.86
Conducting transportation	2,015,645	12.46	114.34	2,040,453	13.19	121.88
Maintenance of transportation equipment	387,492	2.40	21.98	382,607	2.47	22.85
Housing and hostling transportation equipment	185,308	1.15	10.51	186,955	1.21	11.17
Power	634,724	3.92	36.00	613,676	3.97	36.65
Commercial	60,820	.38	3.45	49,724	.32	2.97
General	335,636	2.07	19.04	290,170	1.88	17.33
Depreciation and amortization	685,114	4.24	38.87	685,114	4.43	40.93
Total operating expenses	$4,716,106	29.16	267.52	$4,631,508	29.95	276.64

INCOME STATEMENT

	1923	1922
Operating revenues	$5,690,598 67	$6,216,569.45
Operating expenses	*$4,716,106 54*	*$4,631,508.20*
Operating income	974,492.13	1,585,061.25
Miscellaneous revenues and expenses	*813.73*	11,533.36
Gross income	973,678.40	1,596,594.61
Deductions from gross income	*804,042.15*	*835,532.61*
Net income	169,636.25	761,062.00

March 1, 1923—Cash fare, 5 cents. Transfers, 2 cents. Tokens, 4 for 25 cents, good for fare with transfer.

June 16, 1923—Cash fare, 10 cents. Token fare, 8⅓ cents. Transfers free.

The total gross revenue for the year was $5,689,785, compared with $6,228,103 for 1922, reflecting clearly the loss due to the 3½ months of operation at the 5-cent fare. On the other hand, operating expenses increased from $4,631,508 in 1922 to $4,716,107 in 1923. This was due to increased costs in all departments except transportation, which showed a decrease, owing to the large proportional increase of one-man car-miles, which went up 64.45 per cent over the previous year while two-man car-miles went down 19.08 per cent.

Operating figures are given in much more complete form in this year's report than previously, the "statistical and comparative report of operation," which is abstracted herewith, giving details of all the operating accounts.

The number of employees was 1,827, of whom 1,157 were trainmen, with salaries of $135 to $155 a month. The highest paid employees on the regular payroll were 44 foremen, receiving $145 to $165 per month. Vacations for the employees cost the railway a total of $138,325 out of a payroll of $3,230,960, or 4 per cent of the total.

A chart is included showing revenue and operating expenses per car mile for each route. In general, these show a balance, the average revenue per car mile being 35.2 cents, while expenses, exclusive of depreciation, were 25 cents. The individual car lines all showed revenues equal to or greater than expenses, except one small crosstown line, while all four of the bus lines had insufficient revenue to cover operations.

INCOME STATEMENT, SEATTLE MUNICIPAL STREET RAILWAY

	1923	1922
Operating revenues	$5,690,598	$6,216,569
Operating expenses	4,716,106	4,631,508
Operating income	$974,492	$1,585,061
Miscellaneous revenues and expenses	813	11,533
Gross income	$973,678	$1,596,594
Deductions from gross income	804,042	835,532
Net income	$169,636	$761,062

PROFIT AND LOSS

Losses accrued (other than income) current annual period		$905.28
Delayed losses accrued in prior periods:		
Cost of retiring plant	$83,941.67	
Adjustment of accounts receivable of prior years	3,608.83	
Plant retired—depreciation of prior years not fully accounted	191,880.16	
		279,430.66
		$280,335.94
Net income		$169,636.25
Gains accrued (other than income) current annual period		569.18
Delayed gains accrued in prior periods		2,262.37
Net income, profit and loss (loss) 1923		107,868.14
		$280,335.94

Accidents were much higher in 1923, the total being 4,627 as compared with 3,989 the year before. The cost of the injuries and damages account was $81,709 against $37,368 in 1922. This was due principally to a large increase in settlements for collisions with vehicles, which went up to $28,000 from $5,522 in 1922. Another large increase in cost was on account of step accidents. While the number went down to 73 from 89, the cost was $16,930 as compared with $3,363 in 1922. The total cost of injuries and damages for the year, however, amounted to 0.51 cents per car mile or 1.44 per cent of gross revenues.

The condition of the property at the close of the fiscal year is shown in the balance sheet and the profit and loss statement, which are published in condensed form. The principal change is the added loss for the year of $107,868, which brings the accumulated railway deficit up to $985,359.

PAYROLLS AND VACATIONS, 1923

Transportation	Payrolls	Cost of Vacations
Office, inspectors, station masters	$109,931	$4,053
Trainmen	1,996,657	87,883
Shops and carhouses	499,620	23,751
Way and way structures	546,403	19,263
Accounting	78,349	3,375
Total	$3,230,960	$138,325

SEGREGATION OF PASSENGER CAR-HOURS AND CAR-MILES

	Car-Hours	Car-Miles
One-man single truck	194,490	1,489,093
One-man double-truck	533,461	5,068,337
Two-man	981,699	9,013,437
Buses	32,725	306,499
Total	1,742,375	15,977,366

CONDENSED BALANCE SHEET OF SEATTLE MUNICIPAL STREET RAILWAY, AS OF DEC. 31, 1923

Capital Assets		
Plant and equipment, less $16,616,789.09, less depreciation $3,065,358.20		$13,551,430.89
Special construction		565,396.63
Loans receivable by bond funds from city railway operating fund		227,000.00
Cash in bond funds		37,602.85
Total capital assets		$14,381,430.37
Total redemption and special fund assets		1,196,889.07
Total current assets		772,079.49
Total deferred charges		76,057.83
		$16,426,456.76
Deficit—Dec. 31, 1923		985,359.24
		$17,411,816.00
Capital Liabilities		
Bonds outstanding	$15,809,000.00	
Bond fund loan payable to railway operating fund	38.62	
Audited and approved claims payable (bond funds)	29.19	
Total capital liabilities		$15,809,064.81
Redemption and special fund liabilities		
Unmatured accrued interest on funded debt	$258,679.17	
Matured unpaid interest on funded debt	4,189.50	
Depreciation fund reserves	6,023.79	
Matured unpaid bonds	400.00	
Total redemption and special fund liabilities		269,292.46
Current Liabilities		
Amounts payable by current (operating) funds to other funds	$975,613.50	
Tokens outstanding	65,457.99	
Audited and approved claims	243,358.32	
Warrants outstanding	49,028.92	
Total current liabilities		1,333,458.73
		$17,411,816.00

Brooklyn Company Offers Stock to Employees

The Brooklyn-Manhattan Transit Corporation on July 15 offered to sell to its employees voting trust certificates for 15,000 shares of its issued and outstanding preferred stock, carrying dividends at the rate of $6 per share per annum, on terms that make the final net cost to the employees approximately $60 per share.

Copies of the circular outlining the offer, together with a letter from President W. S. Menden and subscription blanks have been sent to each of the 14,000 employees of the system. All subscriptions under the offer must be filed with the company on or before July 26.

The subscription price for the stock is $65 per share. The employees have one year in which to pay for the stock and all dividends accrued from July 1, 1924, until final payment for the stock will be credited to the employee's account. In addition two refunds of $1 each a year will be paid to employees who retain the stock purchased under this offer for a period of two years after final payment. To permit the crediting to the employee's account of the dividends accrued from July 1, 1924, until date of final payment, interest at the rate of 5 per cent per annum from Aug. 1, 1924, will be charged on deferred payments.

Employees may subscribe for not more than ten shares and the company reserves the right to reduce subscriptions and allot shares so that every employee may subscribe for and receive at least one share. Employees may cancel their subscriptions at any time before final payment and will receive all payments made together with interest at the rate of 5 per cent per annum on such payments. Prior to final payment the employees cannot transfer their rights to the stock offered except to another employee and then only with the consent of the company. After final payment, however, the voting trust certificates for the stock will be delivered to the subscribing employees without restriction and dividends will be paid directly to them as stockholders.

Suburban Bondholders at St. Louis Seek to Foreclose

Following the failure of the reorganization committee of the United Railways, St. Louis, Mo., to agree upon a basis of refinancing the system satisfactory to holders of the bonds of the St. Louis & Suburban System totaling $6,500,000, the Suburban bondholders committee on July 7 filed suit in the United States District Court to foreclose the bonds. The petition asks for the appointment of a special master to take testimony touching on the validity of the bondholders claim. The mortgages covered by the bonds embrace 116 miles of tracks. A similar petition was filed by the St. Louis Union Trust Company as trustee for the United Railways 4 per cent bonds. United States District Judge Faris took both under advisement.

It is announced that Judge Faris has authorized counsel for Rolla Wells, receiver of the United Railways, St. Louis, to drop court proceedings which are now pending for a review of the valuation of $51,761,384 on the company's properties fixed by the Missouri Public Service Commission in June, 1923. The receiver will drop proceedings provided the city of St. Louis also accepts the $51,761,384 valuation. It is understood that the city is agreeable to this disposition of the matter.

Proposal to Pay Detroit United Preferred Dividend in Stock

Elliott Stevenson, president of the Detroit United Railway, Detroit, Mich., after a meeting of the directors said the dividend of 6 per cent on the common stock would be passed, owing to heavy sinking fund payments for the new loan of $9,000,000. Instead, starting in 1925, shareholders are to be paid 4 per cent per annum in preferred stock, which will amount to about $600,000. This payment is to continue through 1925 and 1926, when Mr. Stevenson hopes increased earnings will permit the payment of common dividends in cash. New preferred stock is itself to pay 4 per cent dividends in cash, or about $24,000 in 1925 and the same in 1926. Thereafter 6 per cent cash dividend is to be paid on this preferred. He is asking shareholders to vote for or against the plan. He expects it to be endorsed, and afterward only formal permission is required from Public Utilities Commission of Michigan.

$200,000 Interurban Issue Offered Direct to Public

Another electric railway is offering its stock direct to the public for subscription. The company is the Milwaukee Northern Railway, Cedarburg, Wis. The issue is a small one compared with ordinary flotations, but the requirements of the property at this time are not very great. The proceeds will be used to finance new capital expenditures. The road consists of about 70 miles of interurban line tied in as regards management with the Milwaukee Electric Railway & Light Company group, which has been very successful in the past in its customer ownership campaigns.

The present offering is $200,000 of 7 per cent preferred stock. The price is $100 a share. The terms are cash or $5 down and $5 a month per share for eighteen months. Interest at 7 per cent on monthly payments takes care of the final payment. The offering has been widely advertised in the daily papers published in the territory served by the company. In concluding the advertisement offering the stock this statement was made:

> The Wisconsin public utilities with which Milwaukee Northern is now affiliated have more than 30,000 Wisconsin share, note and bond holders. They have learned that each new home investor is a new booster for the business. We hope for like results to follow from the sale of Milwaukee Northern's 7 per cent preferred shares to several hundred of our regular customers. We are just as well pleased to sell one share on monthly payments to a small savings investor as we are to sell a hundred shares to a large investor. In either case we feel that we have gained a satisfied partner here at home, who will be able and glad to help us increase the business from year to year.

"L" Stock Going Fast

More than Half $5,000,000 Issued Subscribed by Public and Employees in Six Weeks

Considerably more than half of the issue of $5,000,000 of prior preferred stock of the Chicago Rapid Transit Company, Chicago, Ill., offered to employees and the public, was reported sold on July 16. An average of 400 shares a day was sold in the three days ended July 16, on which date the record of 547 shares was attained. In addition to the usual methods employed the stock is being sold on the elevated platforms and at temporary desks at strategic points.

It is a most unusual operation, this sale of $5,000,000 of 7.8 per cent prior preferred stock on the "passenger partnership" basis, as the Chicago company calls it. Details of the offering have been covered week by week in the JOURNAL, but is interesting to give President Budd's view of the sale as outlined at the recent meeting of the executive committee of the American Electric Railway Association.

The company set aside $1,000,000 for the employees, and with no commissions and no prizes they oversubscribed this amount by $300,000 in a campaign lasting three weeks. Altogether 88 per cent of all the employees purchased one or more shares at 90, with the privilege of paying in twenty months. On June 6 the public sale of stock started. The employees were divided up in teams, with 175 captains and twenty managers in subdivisions. The employees were allowed a commission. About 36 per cent of the purchasers are paying cash and the remainder are paying on a 10-month deferred payment plan. About 30 per cent of the employees paid cash. Mr. Budd said that the plan was interesting because the results so far attained showed that a plan heretofore confined largely to the sale of light and power issues could be applied successfully on a strictly electric railway property.

The rate of return of 7.8 per cent was arrived at because it was thought that a liberal yield would help make the stock popular and also because it provided an even amount of 65 cents a share payable monthly. He said that the success of the whole plan rested on the enthusiasm of the sales force and that in order to have that it was deemed best to sell the stock to the employees first. Each employee of the company will have to sell only eight shares to put the plan over. Every employee is expected to sell at least one share.

Bay City Road Being Scrapped

There appears to be little possibility that local electric railway service will ever be resumed in Bay City. Bond holders of the bankrupt Saginaw-Bay City Railroad are not inclined to invest any new money in the enterprise as was done in Saginaw. According to announcement made at Saginaw negotiations are now under way to junk all tracks and overhead in unpaved streets and the tracks, etc., in paved streets will be retained for use of the Michigan Railroad, which operates interurban cars between Saginaw and Bay City.

The trolley along the old interurban right-of-way between Zilwaukee and Bay City is being removed and it is expected that the tracks will be junked. Most of the cars that were used in Bay City have been sold to a junk dealer. Only twelve that can be renewed at small expense have been retained.

Bay City has been without local street railway service since August, 1921, when the company operating in that city went into the hands of a receiver.

$1,581,000 of Boston "L" Bonds Offered to Yield 5.35 per Cent

Bids regarded as very favorable were recently received by the Boston Elevated Railway, Boston, Mass., from several banking syndicates for a new issue of bonds by the company. The issue amounts to only $1,581,000, but the prices offered by bankers will materially reduce the interest charge. The proceeds of the new issue will be used to pay off an issue of bonds of like amount that come due on Aug. 1. The old bonds, which were sold when the Boston Elevated had been under the public trust form of operation for only a month, bore 7 per cent coupons. The new issue will bear 5½ per cent. The highest price offered is understood to have been par or close to par and was from a syndicate composed of White, Weld & Company, Blodget & Company, Curtis & Sanger and Paine, Webber & Company, which got the business. The bonds will mature on Aug. 1, 1934. They are being offered publicly at a price to yield around 5.35 per cent.

Favorable Showing in Saginaw Despite $12,065 Deficit

The Saginaw Transit Company, Saginaw, Mich., during its first complete six months of operation lacked only $12,065 of earning enough money to pay all operating expenses, interest on bonds, taxes and depreciation, according to the semi-annual report of the company. Company officials feel very well satisfied with the showing made in view of conditions, especially during the final two months of operation.

The company at Saginaw resumed operations in November after a two-year period of suspension, but it did not furnish 100 per cent service until Jan. 1 of this year, and just prior to that time jitney bus competition existed.

Revenue passengers numbered 4,646,131 and transfer passengers numbered, 862,925. Passenger revenue totaled $295,152 and this was augmented with additional revenue from other sources that totaled $20,892. Operating expenses and taxes were $272,636 and the gross income after taxes was $43,409. The amount allowed for interest on bonds and for depreciation was $55,475, leaving the deficit at $12,065. Car-bus miles operated by the company numbered 1,257,326. To maintain regular service, twenty-nine street cars and eighteen buses were operated.

Decrease in Revenue in Baltimore in June—Fewer Passsengers

A decrease in revenues of the United Railways & Electric Company, Baltimore, took place during June, the first month in which the new 7½-cent fare rate was effective. In a statement issued by the company it is stated that an analysis of the revenue passengers carried shows that out of the total decrease of 10.59 per cent, 4.27 per cent was due to zone extensions and the elimination of fare zones through order of the Maryland Public Service Commission putting the increased fare into effect. The balance of the decrease of 6.32 per cent was due, the company pointed out, to decrease in riding, caused by weather conditions, industrial depression and the fact that there were four Saturdays and five Sundays in June this year as compared with five Saturdays and four Sundays last year.

It was also stated that the change in the number of Saturdays and Sundays, as compared with last year, based upon the passenger revenue, accounts for approximately $22,000 of the decrease of $43,768. One thing has been demonstrated, according to the company, and that is that notwithstanding the change in fare from 14 cents to 7½ cents in a number of zones the decrease in fare did not attract any extra riding. Comparative operating statistics for June follow:

	1924	1923
Car miles	3,040,974	3,085,582
Revenue passengers..	18,330,992	20,502,140
Free transfers	7,722,685	8,054,908
Total passengers	27,114,959	29,560,026

Financial Writer Extols the Tractions as Investments

"A new day appears to be dawning for electric railway investors, and those who have exercised patience now can pretty confidently feel that the industry has passed its darkest period."

This is the conclusion expressed by Paul Willard Garrett in the last of a series of three articles contributed by him to the New York *Evening Post* and based on data secured by him in an independent survey which he made of the industry. Among the sources of information upon which he drew freely were the statistics of the industry prepared by the ELECTRIC RAILWAY JOURNAL, the survey by John F. Layng, published in the JOURNAL for June 28, and the statistical studies made by the American Electric Railway Association.

Among the subjects which he covered were the early history of the industry, traffic increases, the increasing use of the bus, the 5-cent fare and service-at-cost grants. He then turned to the interpretation of the facts, pointing out that the darkest days are past, that the tide has turned and that the outlook for the future is bright. As indicated previously the facts about the industry used by Mr. Garrett have all been available before but he marshalled them for public consumption as has never been done before. In concluding his series on tractions Mr. Garrett said:

> Individual companies, primarily the small ones, still have problems for which the solution does not seem easy. That is why the selection of traction securities requires discrimination. However, it is safe to say that the industry definitely is working into a stronger position and that traction securities, properly chosen, occupy a better market position than they have for some time. The future in many cases is positively bright. In weathering the storms of recent years, the industry has learned better how to avoid trouble. Not only that, the business has been put upon a sound basis, a thing which brightens the outlook for traction securities.

Abandonment Ordered.—The Millville Traction Company, Millville, N. J., has been directed by the Board of Public Utility Commissioners of New Jersey to abandon service in Millville on Broad Street from Buck Street to Columbia Avenue and on Columbia Avenue from Broad Street to Sharp Street and to surrender its franchises on those streets. The proposed abandonment already has been sanctioned by the authorities of Millville.

Application to Abandon Not Opposed.—No objectors appeared at the hearing before the Illinois Commerce Commission on the application of the Aurora, Plainfield & Joliet Railroad for permission to suspend operation because of a steady loss in operation. The company has offered to operate buses in lieu of the trolley cars.

Four New Directors at Winnipeg.—At the annual meeting of the Winnipeg Electric Company, Winnipeg, Man., the board of directors was increased from nine to twelve and, owing to the resignation of F. Morton Morse, secretary, four new directors were elected: A. J. Mitchell, formerly vice-president of the Canadian Northern Railway and now of the Canadian National Railway; R. J. Fleming, Toronto; G. W. Allen, K. C., and George F. Galt, Winnipeg. Assistant Treasurer Palk will succeed Mr. Morse. The Winnipeg Electric Company is the successor to the Winnipeg Electric Railway.

Partial Abandonment Permitted.—The Public Service Commission recently issued an order permitting the Geneva, Seneca Falls & Auburn Railroad to abandon the portion of its route in Pulteney Street between Jay and St. Clair Streets in the city of Geneva. It was found by the commission that public interest did not require its continued operation. Approval is granted on condition that the railroad shall remove all of its structures from Pulteney Street and restore the highway to good condition.

Decision in Abandonment Expected.—Decision in the case of the Pennsylvania & New Jersey Railway, Trenton, N. J., which is seeking to abandon service on the Newtown, Pa., and Lambertville, N. J., divisions and the Mill Street branch of the Morrisville, Pa., division, will be announced after the engineering department of the Public Service Commission of Pennsylvania secures more data from the towns interested in the matter. The hearing on the application of the traction company was continued on July 9 in Philadelphia and all the data were turned over to the engineering bureau. Morrisville is the only borough opposing the petition.

Preferred Stock Offered.—W. C. Langley & Company, New York, are offering at 99½ and accrued dividend to yield 7.04 per cent 8,000 shares of the cumulative preferred stock of the Carolina Power & Light Company, Raleigh, N. C. The proceeds from this sale will be applied to the cost of additions, extensions and improvements and to other corporate purposes. The company owns and operates the railway system in Raleight and Asheville, N. C., and suburbs.

Bonds Offered.—The National City Company and Harris, Forbes & Company, New York, recently offered at 99 to yield more than 6.12 per cent, $2,496,000 of the general and refunding mortgage 6 per cent, ten-year gold bonds, of the Washington Railway & Electric Company, Washington, D. C. The purpose of the issue is to furnish funds to reimburse the company for funds used on Dec. 1 last to redeem $1,000,000 of general mortgage 6 per cent gold bonds and for property improvements.

Commission Considering Abandonment Petition.—The Public Service Commission of Pennsylvania is expected to act favorably on the application of the Trenton, Bristol & Philadelphia Street Railway to abandon the operation of its line along Bristol Pike, between Croyden, Bucks County and City Line be granted. Commissioner Clement has recommended that this be done. The commission will also probably act favorably on the application of Minot J. Hill for a certificate of convenience to operate motor vehicles as a common carrier on that portion of the line about to be abandoned.

Short Trolley Being Dismantled and Sold.—The Corry & Columbus Traction Company, Corry, Pa., which recently discontinued service, is dismantling its power house and offering equipment for sale. The overhead material has been disposed of and it is expected to offer the other equipment for sale within a short time. The road was 4 miles long. Oscar S. Fritz, president and general manager, is in charge.

Abandonments Allowed.—The State Corporation Commission has authorized the Virginia Railway & Power Company to abandon its navy yard line in Portsmouth. The company submitted proof that it was losing $4,693 annually from the operation of this line. At the same time the commission ordered a temporary suspension from July 1 until Sept. 15 of the Port Norfolk-Pinner's Point line and the Park View and Cemetery line.

Connecticut Road Awarded $33,142 Verdict.—An opinion by Judge L. P. Waldo Marvin, filed with the Superior Court at Norwich, Conn., finds for Receiver Robert T. Perkins of the Shore Line Electric Railway in his suit against Louis T. Levenson and others, to recover the cost of taking up rails on portions of the line which were abandoned. Levenson took a contract to tear up the rails and dispose of them but did not complete it and the receiver had to carry through the task and sell the material on the market. He sued to recover for labor and the court awards $28,206 with interest of $4,936. The company which went on Levenson's bond is held to be liable.

Personal Items

D. E. Parsons Leaves East St. Louis

Manager of Railway and Lighting Properties Will Re-engage in Manufacturing Activities

D. E. Parsons, for the past nine years general manager of the East St. Louis & Suburban Railway, operating in East St. Louis and neighboring towns, has resigned. Mr. Parsons will become identified with the Railway & Industrial Engineering Company, Greensburg, Pa., manufacturers of outdoor substations, outdoor lightning arresters, switches and choke coils. Mr. Parsons has been interested in this company since it was organized some time ago by old friends and former associates. The business has expanded to a point where the need exists for securing additional engineering and management talent, and Mr. Parsons was prevailed upon to associate himself with the new company. He will probably be affiliated with the sales organization.

The resignation of Mr. Parsons was in no way a surprise to W. H. Sawyer, president of the railway, as Mr. Sawyer and Mr. Parsons had talked the matter over several times. Still the announcement of the final decision of Mr. Parsons to resign came to Mr. Sawyer with a feeling of regret on his part that the pleasant association of many years would be terminated. Mr. Parsons desires that he be permitted to relinquish his railway duties on Aug. 1, and every effort is being made to arrange matters so as to comply with his request.

Of interest in this connection is the statement attributed to Mr. Sawyer to the effect that no further changes in the official personnel are planned at this time. The duties now being performed by Mr. Parsons will be divided among the department managers until some other arrangement appears to be desirable. The posts which Mr. Parsons will relinquish embrace the position of general manager of the East St. Louis & Suburban Railway, East St. Louis Railway, St. Louis & Belleville Electric Railway, East St. Louis Light & Power Company and the St. Louis & East St. Louis Electric Railway.

Mr. Parsons became identified with the properties at East St. Louis on Jan. 1, 1916. He took to the position a wealth of experience along engineering, management and selling lines, not the least important of which was his ability, natural and cultivated, to work sympathetically with others, and to promote good public relations. He went to the East St. Louis post direct from the employ of the Westinghouse Electric & Manufacturing Company at East Pittsburgh. His work with the Westinghouse company dated from 1904, when he entered the technical two-year apprenticeship course in the works of the company. At the end of his student period with the Westinghouse organization Mr. Parsons accepted a position in the sales department, and in 1906 was promoted to be head of the export department. In 1908 he represented the mining department in the sales organization at the branch office of the Westinghouse company in Fairmont, W. Va. In 1909 he was appointed to represent the railway and lighting department in the Pittsburgh office, handling especially accounts with public utility properties throughout eastern Ohio, northern West Virginia and western Pennsylvania.

Mr. Parsons was identified with numerous social and civic activities in East St. Louis and gave much time to promoting better relations in all of them. He was one of the sustaining members of the Boy Scouts organization, was a member of the East St. Louis Rotary Club and the St. Clair Country Club, was an advisory board member of the Salvation Army and became widely known throughout the entire East St. Louis district for his public spirited activities. In 1918 he was elected president of the Illinois Electric Railway Association.

D. E. Parsons

Mr. Parsons was born at Huntington, W. Va., on Oct. 29, 1882. He entered West Virginia University for the degree of bachelor of science and was graduated in the year 1903.

William T. Rossell Goes to Pittsburgh

William T. Rossell, superintendent of the Cincinnati, Covington & Newport Street Railway, Covington, Ky., resigned July 12 to accept a similar position with the Pittsburgh Railways, Pittsburgh, Pa. He will assume his new duties on July 20. Mr. Rossell had been employed by the Cincinnati, Covington & Newport Street Railway, better known as the "Green Line," for the last six years. Prior to that he was with the Cincinnati Traction Company in the engineering department.

Mr. Rossell was graduated from the West Point Military Academy. His ability as an engineer when in Cincinnati attracted the attention of the operating officials in charge of the Cincinnati, Covington & Newport Street Railway, who placed him in charge of its equipment in Kentucky. His new position will virtually place him in charge of the entire equipment of the Pittsburgh Railways. Mr. Rossell is a Cincinnatian by birth. His father was at one time one of the foremost engineers of the city.

J. D. Whittemore Assumes General Managership at Fairmont

J. D. Whittemore, who has been general manager of the public utilities at Greensboro, N. C., operated under the direction of the Barstow management, will become general manager of the Monongahela - West Penn Company, Fairmont, W. Va., according to an announcement made by Capt. George M. Alexander, president of the corporation. Mr. Whittemore will be general manager of all the branches, including railways, gas and light.

Some years ago Mr. Whittemore was employed by the General Electric Company at Schenectady and later was transferred to Boston to the construction department. He subsequently entered the industrial engineering department of the Rochester Railway & Light Company. In the fall of 1917 he was appointed general manager of the West Virginia Traction & Electric Company in Wheeling, following a general managership with the Claremont Railway & Lighting Company, Claremont, N. H. Later he joined the West Penn interests in Pittsburgh and then went with the Barstow Management Corporation.

The West Penn Public Service Company, of which he will assume the managership, formerly had a general manager of railways, but following the resignation of E. Blaine Moore from that post on Dec. 31, last, the position was abolished.

H. C. Patten has been appointed comptroller of the Toronto Transportation Commission. He was formerly engaged in cost engineer work in the commission's office. In his new work he succeeds H. P. L. Hillman, who has been acting comptroller for the commission.

Millard F. Clement, formerly assistant engineer in charge of additional electrical construction on the New York, New Haven & Hartford Railroad, has been appointed local manager of the Orange County Public Service Company, Inc., Middletown, N. Y., operating an electric light and power system recently placed under the management of Charles H. Tenney & Company, Boston, Mass. Mr. Clement was graduated in electrical engineering in 1910 from the Worcester Polytechnic Institute and received the degree of E.E. there in 1912. His early electric railroad work included terms of service on the New Haven system and on the Pennsylvania and the Norfolk & Western electrifications. During the World War he was assistant electrical officer aboard the *U.S.S. New York* with the Grand Fleet in charge of interior electrical communication and fire control systems. In 1919 he was assistant foreman of electrical car equipment in the Philadelphia electric zone. Later he became electrical research engineer for the McGraw-Hill Company, Inc., New York, publisher of the ELECTRIC RAILWAY JOURNAL. Since April, 1920, Mr. Clement has been assistant electrical engineer of Charles H. Tenney & Company, Boston.

Messrs. Bell, Penick and Bayliss Promoted

Virginia Railway & Power Company Announces Changes in Personnel in Light and Power, Railway and Valuation and Purchasing Staffs to Fill Gaps in Ranks Caused by Death of John E. Harvell

THOMAS S. WHEELWRIGHT, president of the Virginia Railway & Power Company, Richmond, has appointed William C. Bell chief engineer and general manager of the light and power system of the company in the six cities in which it operates. J. M. Penick was at the same time appointed general manager of the Richmond & Petersburg railway division and John Y. Bayliss was named valuation engineer and director of purchases and supplies for the system. These promotions were made to fill the gaps in the ranks caused by the death of John E. Harvell a few weeks ago.

W. C. Bell

J. M. Penick

J. Y. Bayliss

Mr. Bell went to Richmond from San Francisco, Cal., where he was employed with two of the largest public utilities of the West Coast. Mr. Bell originally was from Texas and was graduated from the University of California. He went to the Pacific Gas & Electric Company, San Francisco, from school and from this position went to the San Francisco Power Company, San Francisco, a year later. His connection with the Virginia Railway & Power Company dates from 1911, when he took a position in the design department of the Twelfth Street power house. He was employed there until 1913, when the work was completed. He then became assistant general superintendent of lighting and an electrical engineer for the company. In 1920 he was made purchasing agent and chief engineer of the system. From this office he has just been advanced to his present position.

Mr. Penick has heretofore been general superintendent of railways of the Richmond and Petersburg divisions as well as the Richmond-Petersburg interurban division. He has served in these capacities since January, 1923. Mr. Penick joined the company in October, 1910. His first work was assistant engineer in charge of the construction of reinforced concrete carhouses, this being the first big construction work under the company's program for rehabilitating the property after its reorganization in July, 1909.

In February, 1911, Mr. Penick was promoted to assistant chief engineer of railways, having charge of the construction and reconstruction of track, and in January, 1917, he was made engineer of maintenance of way and structures in charge of maintenance and construction of tracks, bridges and buildings. In March, 1922, as chief engineer of railways of the company, he was also placed in charge of equipment. Mr. Penick supervised the installation of the trackless trolley service put into operation recently by that company in Petersburg.

Mr. Bayliss a Graduate Engineer

Mr. Bayliss was born in Memphis, Tenn. He became connected with the Virginia Railway & Power Company after a score of years' service in many practical posts. Mr. Bayliss is a graduate of Vanderbilt University, with the degree of bachelor of engineering. He started his career with the Bell Telephone Company, in St. Louis, in city surveying and computing. A year later, in 1897, he went to Grenada, Miss., as engineer in charge of constructing sewers. In 1898 he took the position as leveler in a location party for the Kansas City, Memphis & Birmingham Railroads, in Alabama, and in 1898 he became assistant city engineer at Jackson, Miss. In the next few years Mr. Bayliss was employed as a draftsman and recorder in surveys of the St. Lawrence River from Ogdensburg to Montreal, under the United States Deep Waterways Commission; transitman, chief draftsman and resident engineer on the heavy mountain construction of the Guayaquil & Quito Railroad in Ecuador; assistant engineer on maintenance and division engineer in charge of 35 miles of main line construction for the Frisco System in Arkansas.

In 1905 he became assistant engineer on design and construction and in charge of erection of steel bridges and viaducts for the Guatemala Railway, and in 1906 became division engineer in charge of locating 50 miles and constructing 93 miles of the Missouri & North Arkansas Railroad in the Ozark Mountains, in Arkansas. In 1908 he became principal assistant engineer of the Medeira Mamore Railway under construction in Brazil.

Railroad Valuation Experience

Just before entering the employ of the Virginia Railway & Power Company he was district engineer of the southern district in the valuation of the railroads of the country under the Interstate Commerce Commission in Chattanooga, Tenn. He left this position in the fall of 1921 to become first assistant engineer and purchasing agent of the Virginia Railway & Power Company. Later he became valuation engineer, general superintendent of materials and supplies, valuation engineer and director of purchases and supplies, in the order named. From this position he was promoted to valuation engineer and director of purchases and supplies.

M. C. Morton, superintendent of the Fort William Electric Railway, Fort William, Ont., has absorbed the duties of master mechanic. The latter position was vacated recently by the resignation of E. H. Workman.

B. J. Yungbluth, formerly assistant vice-president of the Philadelphia Rapid Transit Company in charge of finance and accounting and supervisor of purchasing and supplies, has been appointed assistant vice-president in charge of traffic. The former positions have been abolished. W. L. Maize, purchasing agent; W. E. Scott, superintendent of supplies, and H. A. Skinner, manager printing department, will report directly to W. K. Myers, vice-president in charge of finance and accounting.

Frank Wilson has been promoted to assistant division superintendent of the First Division of the United Railways, St. Louis, Mo. Mr. Wilson entered the service of the company in July, 1898, as a conductor on the Bellefontaine division. In 1899 he was made assistant foreman at the Bellefontaine sheds, then part of the Union Depot Company. Since then he has served as starter, day and night transfer clerk, receiver, teller in the treasury department and day foreman at the Kossuth sheds.

William H. Hodge, manager of the advertising and publicity department of H. M. Byllesby & Company and the Byllesby Engineering & Management Corporation, Chicago, Ill., has been elected president of the Public Utilities Advertising Association. The association, organized two years ago, is composed of representatives of utility companies and utility equipment manufacturing companies throughout the United States. Its object is to improve the status of utility advertising and increase its efficiency. The Public Utilities Advertising Association is affiliated with the Associated Advertising Clubs of the World. Mr. Hodge has been in charge of the advertising and publicity department of the Byllesby organization since the department was established in 1910. He was formerly a newspaper reporter and magazine editor. Mr. Hodge has been closely identified with the development of modern methods of public relations and customer-ownership financing, and has written and talked extensively on these subjects.

Obituary

John G. Ferres, Johnstown, N. Y., vice-president of the Fonda, Johnstown & Gloversville Railroad and president of the Johnstown National Bank, died on July 3, at the age of 80 years, following a brief illness.

William T. Ruete, inventor and authority on interior conduit, died June 7 in New York City. At the time of his death he was consulting engineer of the conduit and wire division of the General Electric Company.

Edward F. Latimer, who was actively identified with early electric railway work in Connecticut and who was in charge of the conversion of the Waterbury system from horse to electric traction, died recently at his home in Edgewood, R. I. Mr. Latimer for the past eleven years had been superintendent of construction for the Narragansett Electric Lighting Company of Providence, R. I. For four years he was in the employ of the United Gas Improvement Company and was in charge for a time of erection work for the McIntosh & Seymour Engine Company. At one time he was with the Southern New England Telephone Company.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Demand Continues for Space at Convention

Increase This Year Is 18 per Cent—Placing Heavy Exhibits Is a Problem

Space assigned on July 15 for the exhibit at the annual convention of the American Electric Railway Association to be held in Atlantic City next October was 18 per cent in excess of the amount assigned on the similar date last year. The space allocated so far this year is 65,383 sq.ft., as compared with 55,421 on July 15, 1923, an increase of 9,962 sq.ft. Of the total amount 19,685 sq.ft., or approximately 30 per cent, is to be used by bus manufacturers.

Requests on hand from railway supply houses, bus manufacturers and dealers in accessories and supplies total an additional 8,000 sq.ft. Inasmuch as the convention is still more than two months away it is expected that the actual space sold will be somewhat in excess of last year's record figure of 75,681 sq.ft. This is considered by the exhibit committee to be very gratifying, the more so because the National Electric Light Association and the American Railway Association recently had exhibits in Atlantic City by many of the same manufacturers who will exhibit at the A. E. R. A. convention.

Companies in addition to those listed in the ELECTRIC RAILWAY JOURNAL, issue of June 28, page 1039, which have applied for exhibit space are as follows:

American Brass Company.
Berry Brothers.
Cheatham Electric Switching Device Company.
Chicago, North Shore & Milwaukee Railroad.
Chicago Rapid Transit Company.
Barron G. Collier, Inc.
Commonwealth Steel Company.
Continental Motors Company.
Charles I. Earll.
O. M. Edwards Company.
Ellcon Company.
Fageol Motors Company.
General Electric Company.
Gould Coupler Company.
Graham Brothers.
Hubbard & Company.
International Harvester Company.
International Register Company.
Irving Iron Works Company.
Leece-Neville Company.
Metal & Thermit Corporation.
Morton Manufacturing Company.
Nachod Signal Company, Inc.
National Lead Company.
National Safety Devices Company.
Newport Coach Company.
New York Transportation Company.
Panelyte Board Company.
Pittsburgh Testing Laboratory.
Root Spring Scraper Company.
Safety Car Devices Company.
Sattley Company.
Star Brass Works.
Taylor Electric Truck Company.
Tuco Products Corporation.
Van Dorn Coupler Company.
Westinghouse Companies.

The necessity to allocate exhibit spaces for buses where the construction of the pier makes it safe to place heavy material of this kind has caused some delay in such allotment. Officials of the A. E. R. A. have been hard at work solving this complicated problem and expect soon to have it worked out to a satisfactory solution.

$9,000,000 Spent for Buses and Garages

More than $9,400,000 has been invested to date by the electric railway industry in buses and bus garages, according to V. E. Keenan, superintendent of the bus department of the United Electric Railways, Providence, R. I.

Mr. Keenan estimates that out of the $150,000,000 which will be spent by the railways during the year for improvements and betterments 4 per cent will go for automotive equipment. He predicts an expenditure of $6,000,000 by the industry for buses in 1924.

Big Detroit Order Goes to the General Electric Company

A contract has just been awarded by the Department of Street Railways, city of Detroit, to the General Electric Company covering a large amount of automatic substation equipment. Ten 2,000-kw. and four 1,000-kw. synchronous converters are included. This is said to be the largest order of its kind ever placed in the United States. Fourteen proposed substations, which will greatly increase the electrical capacity of the municipal railway system in Detroit, have been designed by Smith, Hinchman & Grills, consulting engineers and architects. All of the transformers will be of the outdoor type, although both semi-outdoor and indoor design will feature the substations themselves.

Delivery of the apparatus will be arranged under agreement with the building requirements of the city and will extend until October, 1926. The capacity and location of the new substations have been arranged to fit in with the present feeder system supply-

Metal, Coal and Material Prices

Metals—New York	July 15, 1924
Copper, electrolytic, cents per lb.	12.40
Copper wire base, cents per lb.	14.75
Lead, cents per lb.	7.00
Zinc, cents per lb.	6.20
Tin, Straits, cents per lb.	45.125
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.325
Somerset mine run, Boston, net tons	1.95
Pittsburgh mine run, Pittsburgh, net tons	2.125
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.675
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.00
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags.	2.20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.01-$1.04
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.625
Turpentine (bbl. lots), N. Y., per gal.	$0.84

ing the railway line. All the substations will operate from the present 24,000-volt, three-phase, 60-cycle transmission line. The apparatus includes high reactance type, oil-cooled, single-phase transformers with 24,000-volt, primary, automatic switching equipment, outdoor type oxide film lightning arresters, oil circuit breakers for the incoming lines and high-speed circuit breakers for the protection of the various substations. The converters will be equipped with the standard G.E. flash barriers and the stations will be fully automatic, including reclosing feeders.

Rolling Stock

Philadelphia & West Chester Traction Company, Upper Darby, Pa., it is reported, has awarded a contract to J. G. Brill Company for ten new cars at a cost of $19,000 each. It is said the motor equipment will be furnished by the General Electric Company.

Helena Light & Railway Company, Helena, Mont., has received its three new cars. The detailed specifications of these cars are as follows:

Date order was placed	Feb. 8, 1924
Date of delivery	June 16, 1924
Builder of car body,	P. A. Thomas Car Works
Type of car	Closed, double-truck safety
Seating capacity	44
Total weight	32,000 lb.
Bolster centers, length	19 ft. 0 in.
Length over all	38 ft. 9 in.
Truck wheelbase	5 ft. 5$\frac{3}{8}$ in.
Width over all	8 ft. 5$\frac{1}{2}$ in.
Height, rail to trolley base	10 ft. 4$\frac{3}{4}$ in.
Body	All steel
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Air brakes	Westinghouse
Axles	Osgood-Bradley
Bumpers	5-in., 6-lb. channel
Car signal system	Consolidated
Car trimmings	Bronze
Center and side bearings	Osgood-Bradley
Conduits and junction boxes	Duraduct
Control	G. E., K-35
Curtain fixtures	Curtain Supply Company No. 28 Ring
Curtain material	Pantasote
Destination signs	Hunter
Door operating mechanism	Pneumatic
Hand brakes	Peacock Staffless
Heater equipment	Consolidated
Headlights	Ohio Brass, Golden Ray
Journal boxes	Symington
Lightning arresters	G. E.
Motors,	G. E. 265 A, four per car, inside hung
Registers	International, air operated
Sanders	Ohio Brass, air operated
Sash fixtures	Dayton
Seats	Heywood Brothers & Wakefield
Seating material	Rattan
Slack adjuster	American, automatic
Springs	Osgood-Bradley
Step treads	Kass
Trolley catchers	Ohio Brass
Trolley base	Ohio Brass, Form 1
Trucks	Osgood-Bradley
Ventilators	Railway Utility, exhaust type
Wheels	26-in. cast iron

Track and Line

St. Louis, Mo. — The Aldermanic Streets and Sewers Committee of St. Louis voted June 11 to report favorably a bill requiring the United Railways to abandon the private right-of-way in the center of Delmar Boulevard between Kings Highway and the Wabash tracks, remove their trolley poles to the curb line and pave the space between the tracks. The United Railways has opposed the change, which will cost $300,000, and which in the opinion of the United officials will increase the accident hazard.

New Brunswick Power Company, St. John, N. B., has arranged to extend its Fairville line about a half mile. The work will be started this month. This company is now executing a comprehensive plan of relaying rails through paved sections in Fairville and St. John.

Cincinnati, Ohio.—The Cincinnati Street Railway has done away with the old Fairview incline and has replaced it with a reverse curve which carries the line over the bluff on the standard type of track construction. This enables the company to use larger capacity double-truck cars and makes the entire operation safer. Electric Railway Equipment Company tubular poles were used in the new construction.

Montreal Tramways, Montreal, Que., is planning to construct 11.033 miles of track on concrete slab foundation, standard 6-in. x 8-in. wooden ties, 2-ft. centers, and steel tie rods, 6-ft. centers, with electric welded joints. The cost will be $732,000.

Dallas - Denton Interurban Railway, Dallas, Tex., will be extended westward from Denton through Decatur. Ground was broken recently in Denton by starting work on the dump for the line after it leaves the Dallas branch of the Katy.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has announced the completion of track and roadbed rebuilding work which was carried on in the vicinity of Racine, Kenosha and Milwaukee at a cost of approximately $25,000.

Power Houses, Shops and Buildings

Knoxville Power & Light Company, Knoxville, Tenn., has started the construction of a combined storage house and garage. It is proposed to spend $60,000 on the storage quarters and $15,000 on the garage.

Southern Public Utilities Company, Charlotte, N. C., is equipping a new repair shop to be located at the Salem Creek station. The new shop will include modern machinery for the upkeep of the cars. The equipment for the shop is expected to cost approximately $5,000.

Trade Notes

S. E. Church, formerly of the S. E. Church Electric Company, well-known electrical dealers of Chicago, has been appointed district manager of the Chicago office of the Triumph Electric Company. W. R. Bonham, who up to July 1 handled the Chicago interests of the Triumph Electric Company, has resigned to devote all of his time to his farm interests in the South.

Spicer Manufacturing Corporation, South Plainfield, N. J., announces the election of Ralph E. Carpenter, heretofore assistant to the president as vice-president. Mr. Carpenter has been closely identified with the automotive industry for many years. He was at one time assistant to the president of the Aluminum Castings Company, and manager of its extensive experimental laboratories.

Jackson & Moreland, consulting engineers, have moved their offices from 387 Washington Street to 31 St. James Avenue, Boston, Mass.

J. F. Buhr has opened an office in the Blodgett Engineering & Tool Company Building, at Fourteenth and Dalzelle Streets, Detroit, Mich. The J. F. Buhr Machine Tool Company will act as sales representative for the Blodgett Engineering & Tool products.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has recently extended its designs of steel-clad high voltage transformers to include those of 6,900, 11,500 and 13,800-volt rating. Hitherto the sheet-metal construction of distribution transformer cases was limited to 2,300-volt service.

Central Iron & Steel Company, Harrisburg, Pa., has recently appointed C. A. Fischer, with offices at 303 Keystone Building, Houston, and 1918 W. T. Waggoner Building, Fort Worth, district representative. Mr. Fischer is looking after the sales on plates as well as stampings.

New Advertising Literature

Kuhlman Electric Company, Bay City, Mich., has issued a new publication called "Better Street Lighting with Greater Safety." This describes the Kuhlman series multiple street lighting systems.

Electric Railway Equipment Company, Cincinnati, Ohio, is sending out a folder which tells what improved street lighting means. To illustrate the points which the company makes Montgomery, Ala., has been taken as an example. The pamphlet shows many illustrations of that city's combination railway and lighting poles.

Crouse - Hinds Company, Syracuse, N. Y., has issued Folder No. 13, on "Connectors."

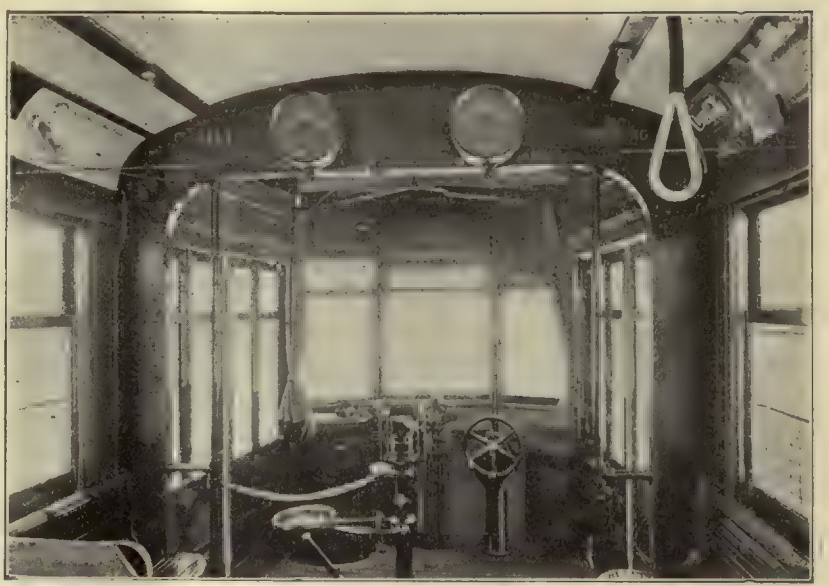
Rotary Snow Plow Company, Minneapolis, Minn., has issued a ten-page pamphlet describing the Snow King lateral type rotary plow in cleaning the highways of snow. Some attractive illustrations are contained in the booklet.

Electric Service Supplies Company, Philadelphia, Pa., has issued Bulletin No. 196, on "Bus Specialties." The pamphlet, of some forty pages, contains a brief description of specialties adapted for use on buses of either the gasoline or trackless trolley types.

Reliance Electric & Engineering Company, Cleveland, Ohio, has issued Bulletin 2016, giving information on type T Reliance planer motors for reversing service.

Conveyors Corporation of America, Chicago, Ill., has published a new booklet describing its American cast-iron storage tank, which is a sectional tank for the storage of all dry, loose, bulky material, such as ashes, coal and sand gravel. The booklet is illustrated with illustrations of tanks in use.

Notice the hand-brake on this car!



PEACOCK STAFFLESS BRAKES

For double-truck safety cars

Especially suited to the modern one-man type of car—

Everybody knows that Peacock Staffless Brakes are practically a universal standard equipment for Birney safety cars. Especially desirable because the high live load ratio on these little cars demands a more powerful brake than the ordinary type.

Many of the orders recently received, however, are for the latest type, *double-truck* one-man type of car. The Peacock Staffless Brake has proved to be amply powerful to stop a loaded car of this type when emergency requires.

It occupies almost no space—the steel housing projecting but 3¼ inches from the dash into the vestibule. It is lightest in weight and has ample braking power and almost unlimited chain-winding capacity.

Order them for your new cars!

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"Repainting Done Inside and Out for $125. per Double-Truck Car"

Says the Eastern Massachusetts St. Ry. Co. of Boston.

Quoting further from the letter received from the Superintendent of Rolling Stock and Equipment, of this large New England property: "Our company has used the DeVilbiss Spray System of painting for two years. We have by this method been able to reduce our cost of painting very materially * * * and are in a position to paint our rolling stock at shorter intervals."

Improvement in quality of work—saving of time—lowered labor costs, are noteworthy advantages made possible by the DeVilbiss Spray-painting System on electric railway car and equipment painting.

Let us work with you. Interesting operation and equipment facts will be gladly mailed. Address—

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The DeVilbiss Spray Gun

The DeVilbiss Spray Gun provides for the most advantageous application of any paint or varnish material. It embraces 17 important, distinctive features, among which are a "Self-centering nozzle," a "Quick detachable spray head," "All parts interchangeable," "Simplicity of design," "Ease of cleaning," and "One model for all purposes." It insures the utmost in spray gun value and service.

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has placed it high among those permanent organizations recognized as National Institutions
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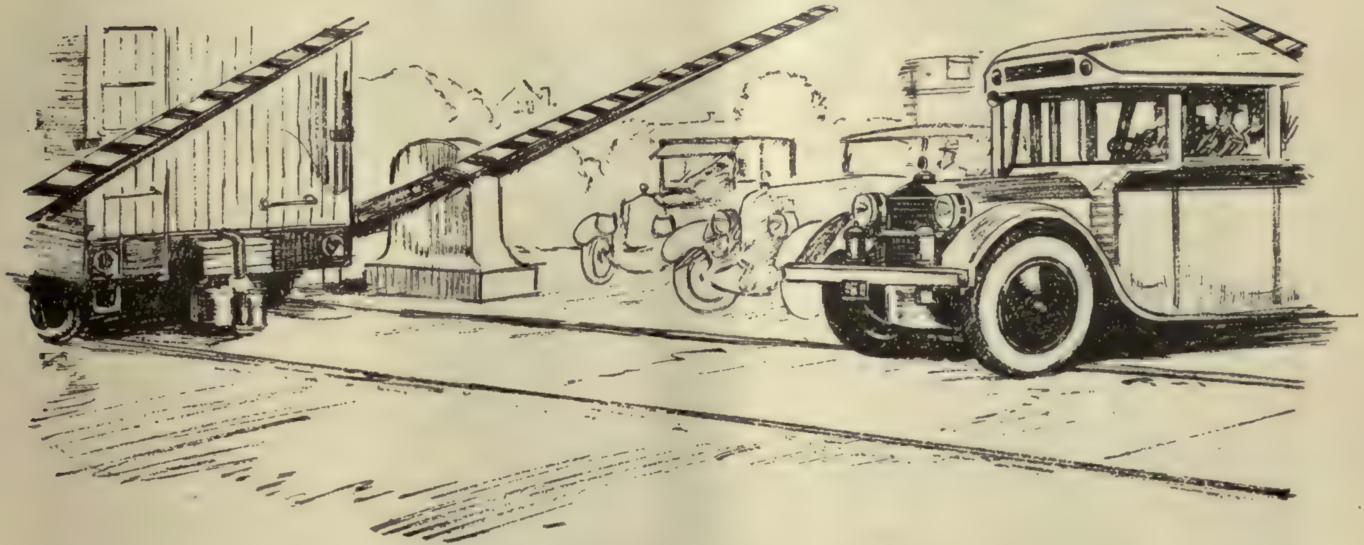
Made by Sheldon under Huck patents



Quicker starts! Hundreds of times a day

A Huck Double Reduction Axle starts the heaviest loaded bus quickly and without effort. It shortens the low gear run before shifting to high. So efficient that a higher gear ratio can be used. The motor can be run at lower speed, saving fuel and gas, and giving the engine a longer life.

Big, powerful, self-energizing Huck brakes gently ease the bus down to a smooth stop in an amazingly short distance, with very little effort on the driver's part.

"The foundation for better buses" is the title of a booklet describing the Huck Axle.

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The removable driving mechanism unit

Partially cut-away view shows how the second reduction is obtained. The entire driving mechanism is centralized in this unit, thus securing perfect alignment of all moving parts and allowing the gears to operate in a bath of oil. Every part is accessible.

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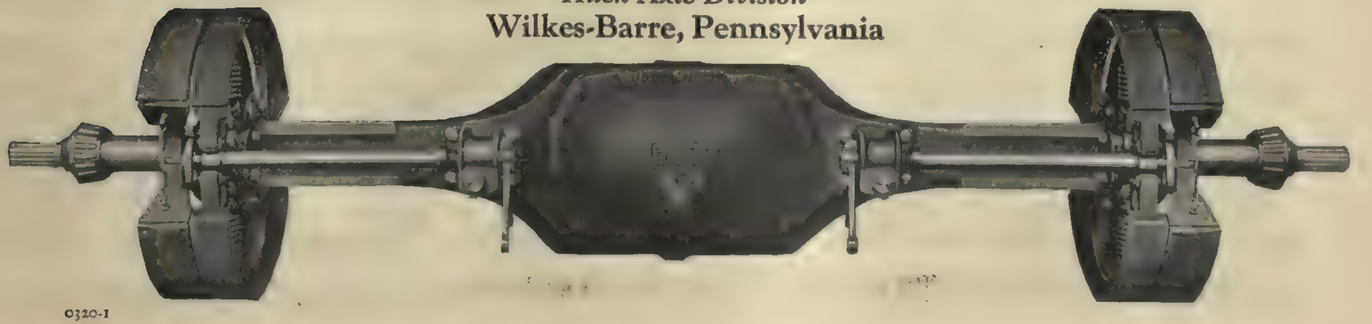

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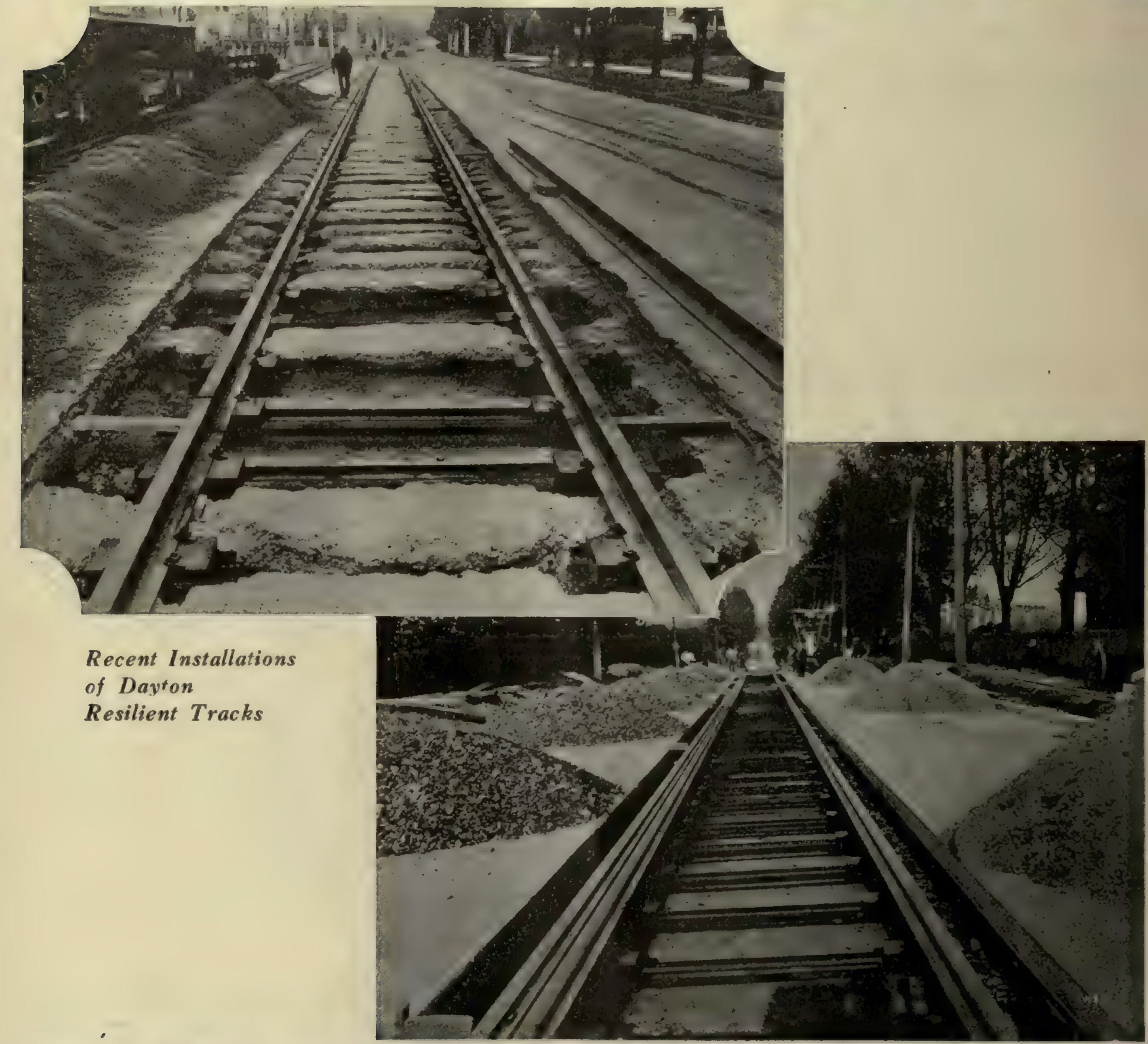
SHOCK



Recent Installations of Dayton Resilient Tracks

DAYTON

Keeps the Repair Shops Busy

A BLOW is as great a shock to the hammer as to the object struck. In street railway operation, the track is the anvil—the rolling stock the hammer. Since shock works both ways, it destroys the rolling stock no less than the track.

And there you have the reason for much of the repair to rolling stock. Little, perhaps, does the repair shop foreman realize that the track is to blame for so much of the work he has to do. In other words, the condition of the track largely determines the amount of rolling stock repair. Sagging joints and uneven track soon knock rolling stock to pieces. Rigid track is no less harmful.

Only by cushioning the shock of traffic can you eliminate this costly evil.

Resilient track construction is what is required to overcome the destructive effects of shock. Resiliency is now recognized as the one indispensable requisite for efficient tracks.

There you have the reason why the use of Dayton Resilient Track is increasing so rapidly. More of it will be laid this year than ever before in its history.

Write us for any further information desired.

The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio

Resilient TIE

Cushions the Shock
On Rolling Stock

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Last year's convention was *big!*

This year's will be *bigger!*

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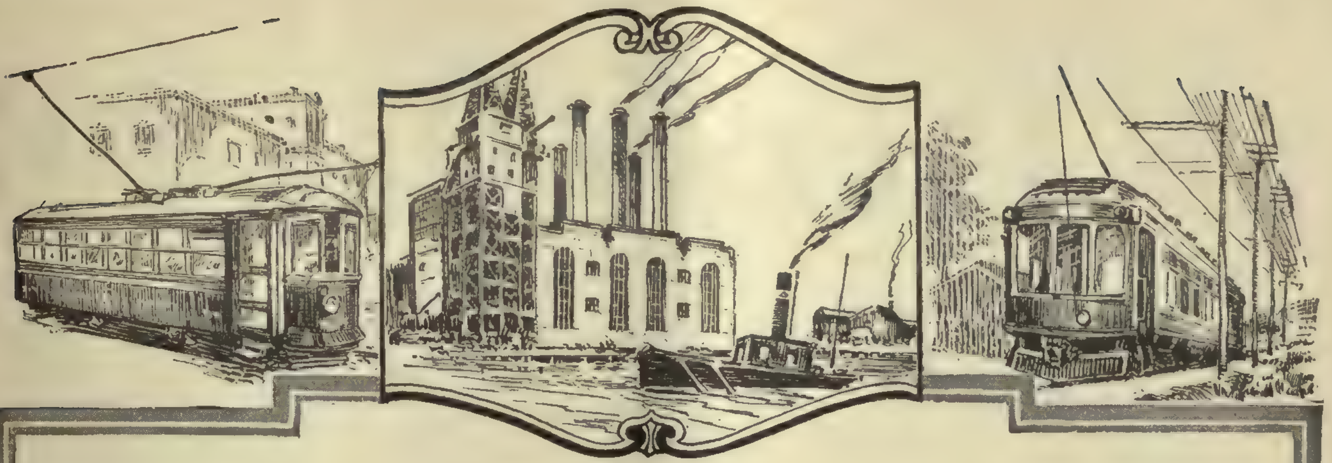

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He knows burning oils from experience, just as he knows lubrication from the experience gathered in the hundreds of millions of car miles made with TEXACO lubricants.

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A compounded oil of excellent quality especially noted for its long burning and its regularity of flame.

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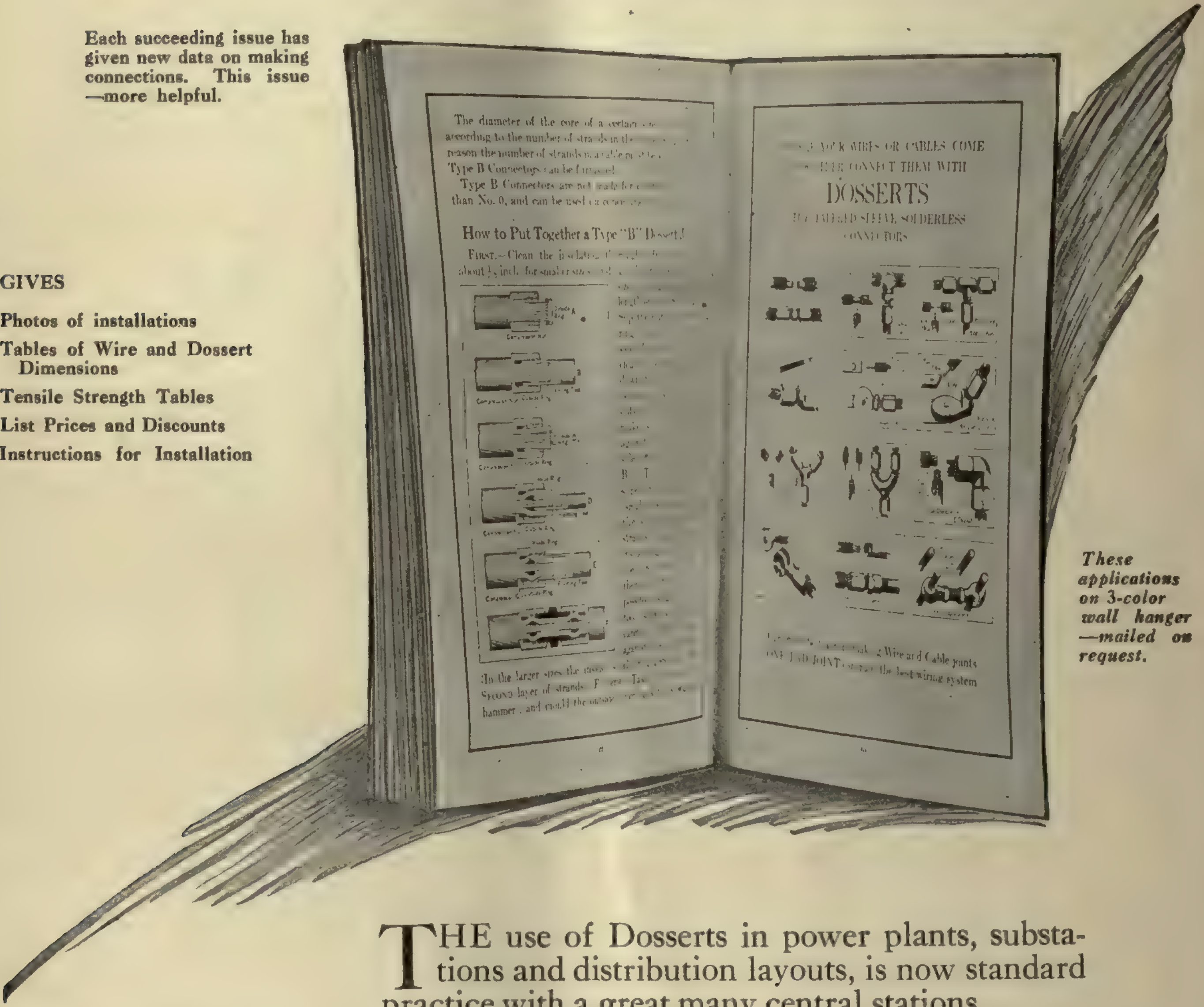
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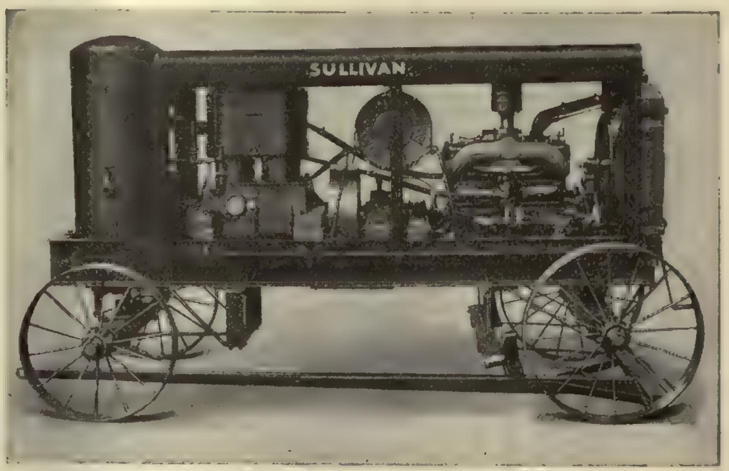
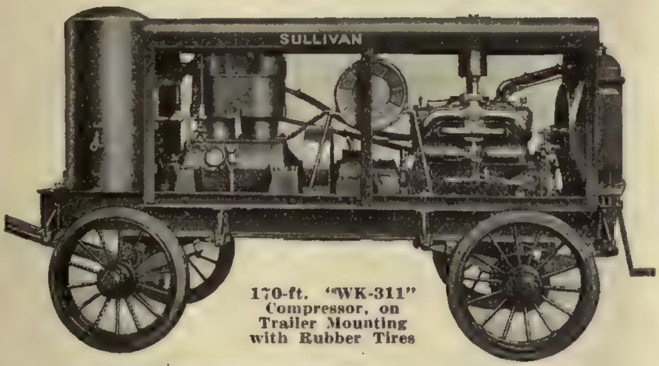
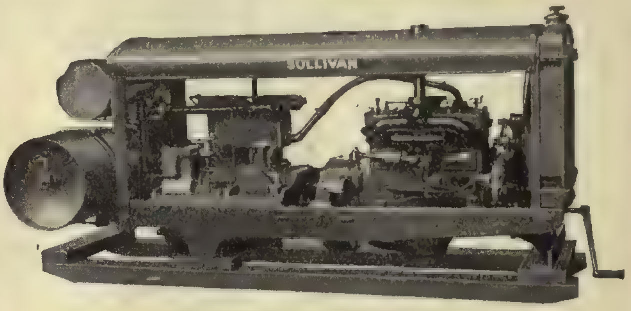


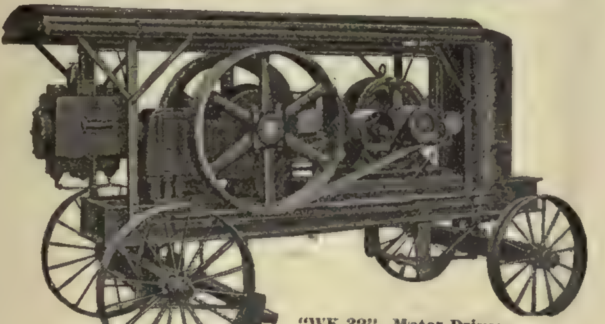
"WK-311" 170-ft. Unit, 31 hp., Gasoline Engine Drive



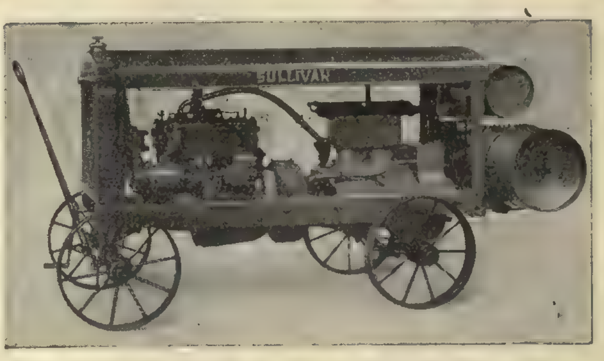
170-ft. "WK-311" Compressor, on Trailer Mounting with Rubber Tires



103-ft. "WK-311," Skid Mounting



"WK-32" Motor-Driven Compressor, built in 4 sizes, 121 to 258 cu. ft.



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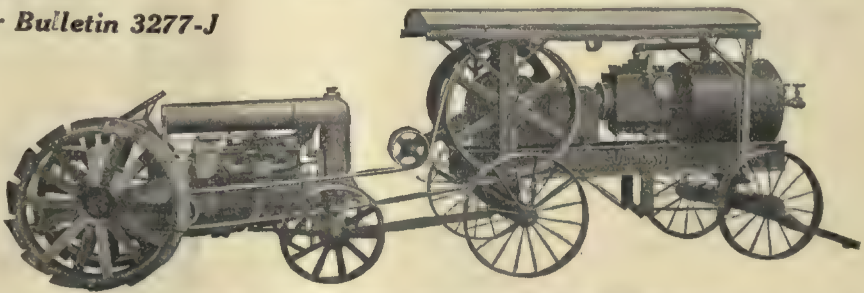

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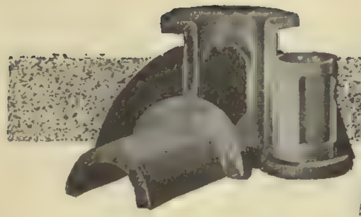

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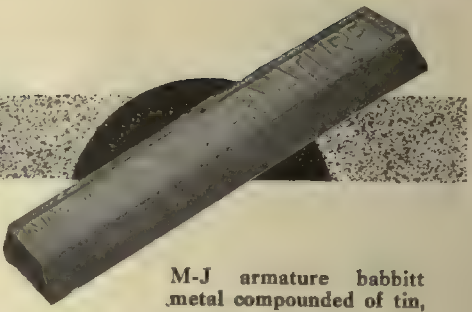

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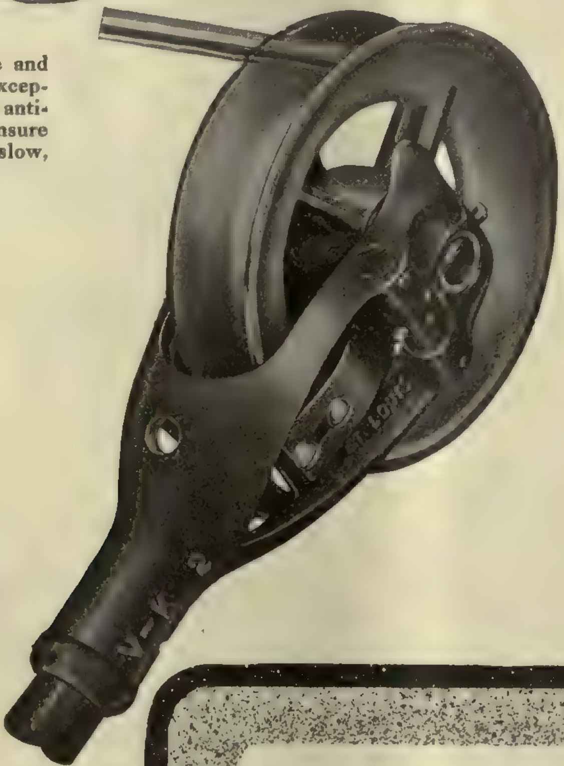

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and
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Uniformity and dependability assure you of satisfaction with every order.

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You can arrange for this service, which may result in a great saving for you, by writing, phoning or wiring our nearest branch.

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on city streets as well as interurban lines

MILLER TROLLEY SHOES

(Patented)

give better contact with less wire wear

Certainly they run on city lines. The Hudson Valley Railway cars enter Troy, N. Y., the Portland-Lewiston Interurbans go through Lewiston and Portland, and numerous other cases might be cited. Several city systems are making exhaustive tests of Miller Trolley Shoe operation on their busy lines.

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For your city lines

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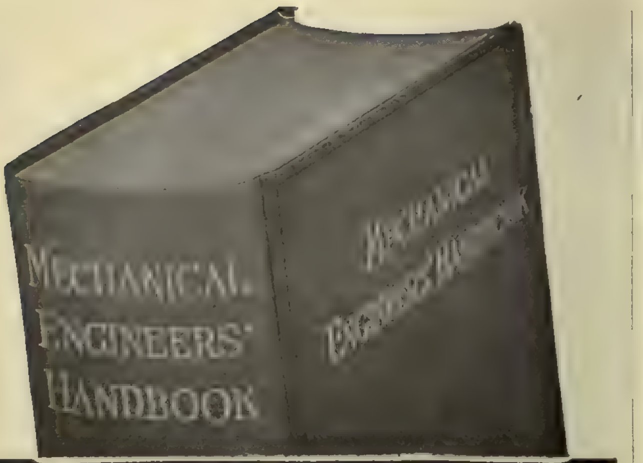
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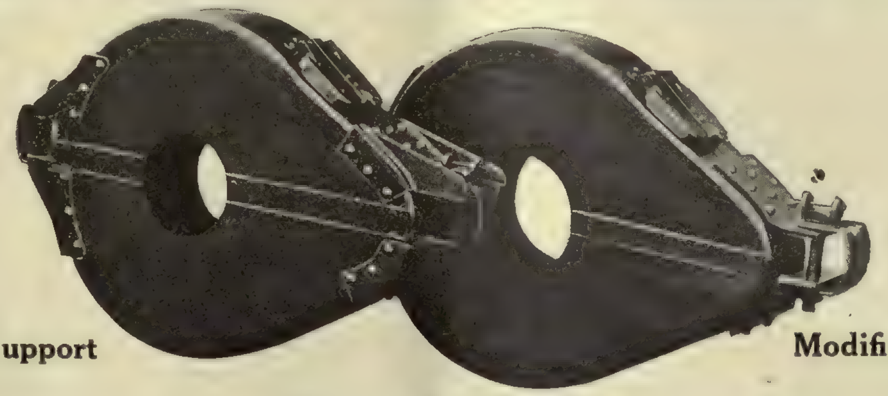

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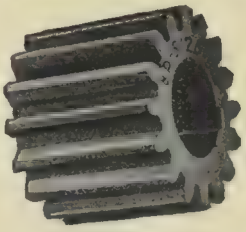

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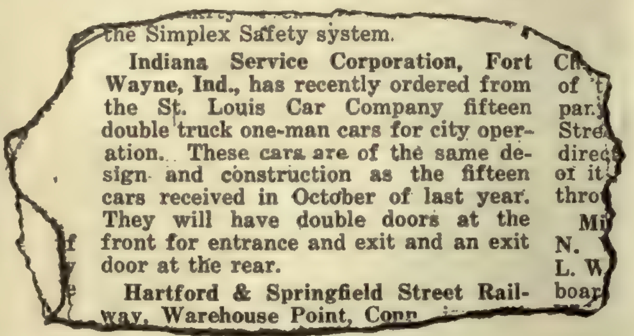

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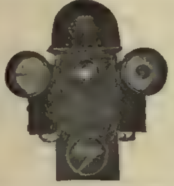

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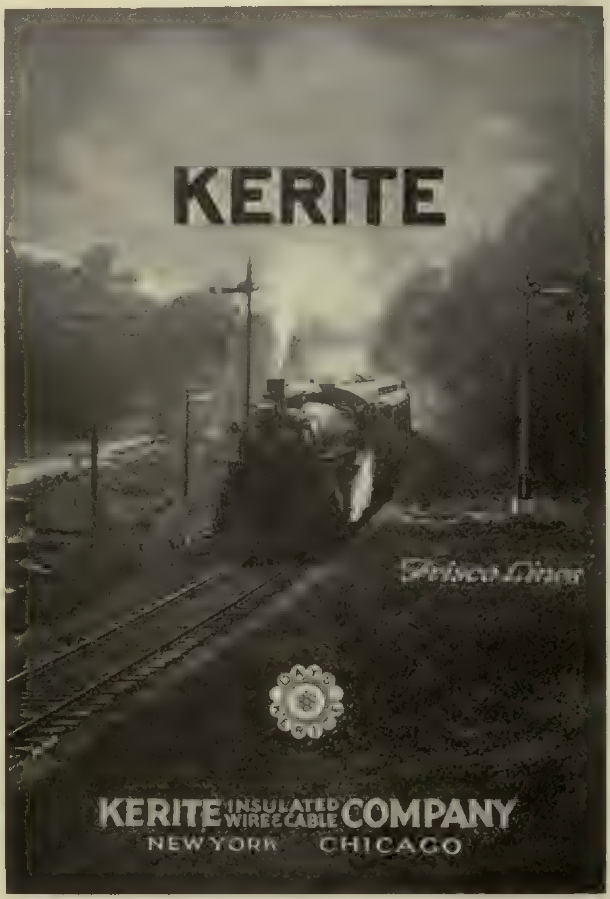

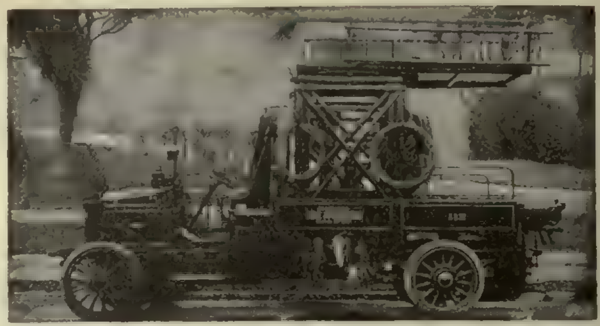
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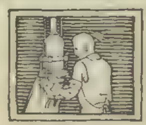
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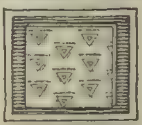
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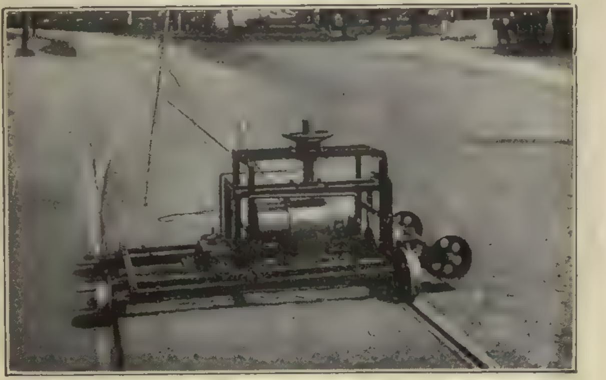

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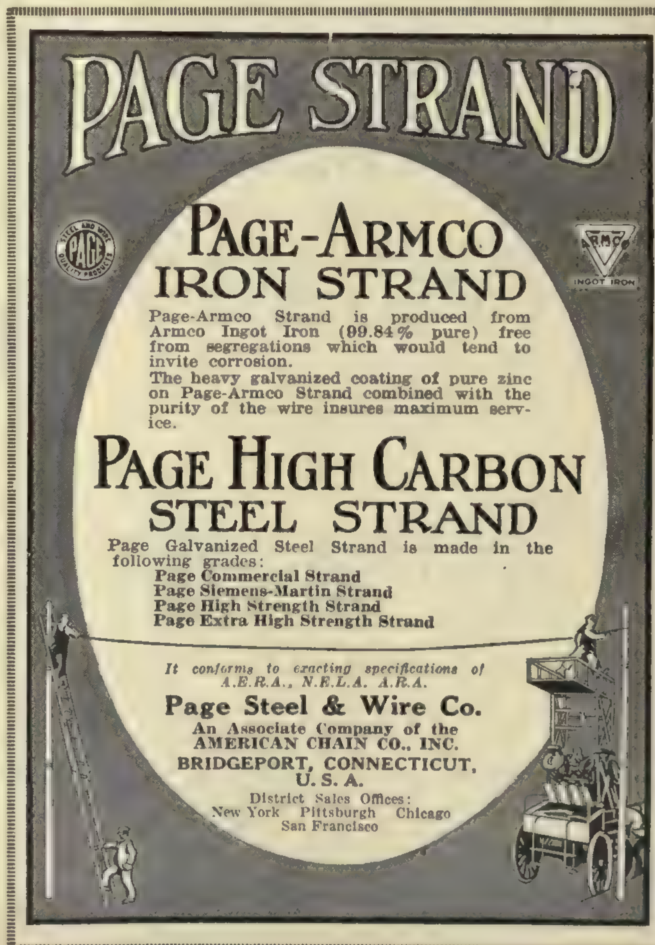
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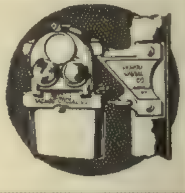

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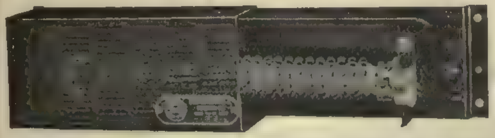

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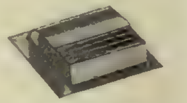

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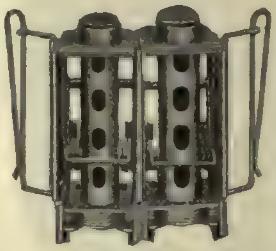

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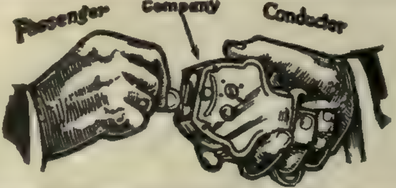

Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
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Don't Overlook Opportunities

Men who regularly keep in touch with the market through other channels often overlook the many opportunities that are to be found in the

SEARCHLIGHT SECTION

For Every Business Want

"Think SEARCHLIGHT *First"*

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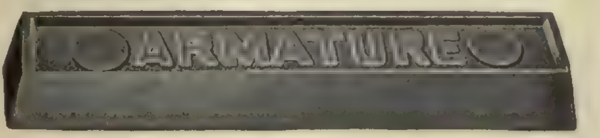

Standard for motor bearings, especially in street railway work

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100 New Users in the Last Nine Months

KASS SAFETY TREADS

HIGH

in efficiency and lasting qualities

LOW

in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

Its semi-annual!

Only about once every six months, do you need to oil up Earll Trolley Catchers or Retrievers. Why? Because they are designed with a *perfect automatic lubrication* system. A small amount of oil, inserted in one specific spot goes directly to the rubbing parts and is retained there. It cannot leak or drip. Therefore Earll Equipment lasts longer and costs less to maintain.

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TURNSTILES

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For light weight construction specify HASKELITE roofs and head-linings as well as PLYMETL exterior side panels and vestibule linings.

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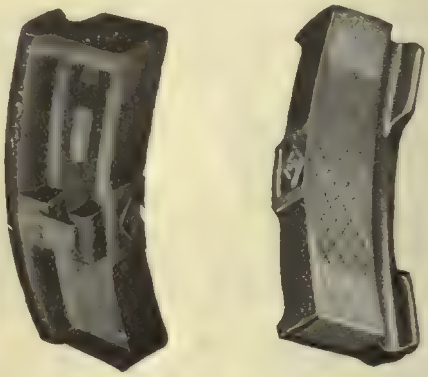

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Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

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You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
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Traction companies are getting from 50,000 to 100,000 miles from the Thornton Trolley Device. The long life of the bearings, the perfectly balanced wheel and the method of lubrication explain this unparalleled service.

Letters from users ring with praise of the Thornton. Reduce your repair bills and road delays by using this device. Ask for Bulletin.

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Incorporated
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RAILWAY UTILITY COMPANY
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HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS
Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
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PS HEATERS

Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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6209 Hamilton Ave., Detroit, Mich.

"POSITIONS VACANT"
Good jobs appear under this heading
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"SEARCHLIGHT SECTION"

EMPLOYERS! *Use* these columns for good men.

MEN! *Consult* these columns for good jobs.

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8 cents a word. *Minimum $2.00 an insertion.*
0130

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UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches..............$4.50 an inch
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Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.F J.

POSITIONS VACANT

ASSISTANT SUPERINTENDENT Wanted—to relieve superintendent of medium-sized city railway system of detail in supervising the operation of cars and maintenance of equipment. Progressive ideas and ability to direct men essential. In replying, please give age, education, experience and salary desired. P-720, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SCHEDULE.-Maker wanted by large street railway; must be competent to analyze traffic data and make schedules for difficult and large routes; give experience, age and salary expected. Chicago Surface Lines, 231 South La Salle St., Chicago, Ill.

POSITIONS WANTED

COMPETENT operating manager—Desires change. Interurban, Street Railway or combination railway and light company. Experience in public relations. Will consider sub-executive position. PW-715, Elec. Railway Journal, Old Colony Bldg., Chicago, Ill.

EXECUTIVE and general manager of interurban electric railway, doing lighting and power business, which has been sold to connecting line fully officered, desires new connection. Thirteen years manager, eleven years president in present situation. Twelve years' previous experience on large city property. Fully understands cultivating and maintaining friendly relations with the public and employees. Forty-seven years of age. Correspondence invited. PW-719, Elec Ry. Journal, Old Colony Bldg., Chicago, Ill.

MASTER mechanic now employed desires to make change; experienced heavy and light interurban, city car and bus maintenance and overhauling. PW-711, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

ON account of the possible abandonment of a small interurban railway, manager, 47 years of age, with 20 years' experience with electric railways, from conductor to manager, is desirous of becoming connected with larger property where there is opportunity for advancement. PW-718, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

YOUNG single man that can get results desires position as auditor, treasurer or assistant to manager public utility property. Nine years' experience; six as general auditor, office manager and secretary and treasurer property operating railway, bus, electric, gas and steam heat departments. Now employed and can furnish best of references. PW-717, Electric Railway Journal, 10th Ave. at 36th St., New York.

FOR SALE

The following parts for Ohio Brass Co. Draw Bar:

76—No. 11504 **Slide Bar Supports.**
33—No. 13219 **Slide Bar Supports.**
7—**Draw Bar Anchors.**
10—**Draw Bar Carriers.**
10—**Draw Bar Slides.**

Newport News and Hampton Railway, Gas and Electric Company
Hampton, Va.

Electric Street Railway Property

FOR SALE

at Burlington, N. C.

The undersigned Receiver and Special Master invites bids on the following Street Railway property:—

- 8.4 miles of No. 70 A. S. C. E. steel rail, double.
- 8.4 miles of 00 copper trolley wire with all fittings of standard construction.
- 5 miles No. 4-7 strand aluminum feeder cable.
- 4 closed cars for one-man operation on Brill trucks, with 1000 G. E. motors.
- 4 open cars with G. E. 800 motors.
- 1 Electric Locomotive equipped with 4-50 H.P. Westinghouse motors.

All motor equipment is for 500 volts direct current.

Bids are now invited to be submitted subject to approval by the United States District Court at Greensboro.

The entire Street Railway property between Burlington, Graham and Haw River will be sold at Public Auction at

The Court House Door in Graham, N. C.,

On July 21st, 1924, at 11 o'clock A. M.

Offers for the above will not be accepted or acted upon until after the sale of the entire property is made on July 21st.

All sales and bids are submitted to the approval of the court.

The property will be shown by Mr. W. R. Dixon or Mr. H. G. Smith at Burlington upon application.

J. H. BRIDGERS, Receiver

And Special Master of U. S. District Court, for the Western District of N. C.
Address replies to me at Henderson, N. C., or Burlington, N. C.

July 2nd, 1924

RAILS

New Relaying

1 TON OR 1000

FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES

All Rails and Track Materials shipped subject to inspection and approval at destination.

L. B. Foster Co.

PITTSBURGH·PA
NEW YORK

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400 Tons 60 Lb. A.S.C.E.

STEEL RAILS

Practically like new.

BIG SAVING

ZELNICKER IN ST. LOUIS

FOR SALE

4 ALL STEEL CARS

Practically New

Length ....45 ft. 6 in.
Length Baggage compartment... 9 ft. 1 in.
Seating capacity 50. Peter Smith Heaters.
Westinghouse Air Brakes.

TRUCKS

Baldwin 6 ft. 4 in. wheel base.
34 in. wheels.

ELECTRICAL EQUIPMENT

Consists of four WH 533 Y 3 (55 HP.) motors. HL control.

Code: "Curio"

Transit Equipment Company
Cars—Motors
501 Fifth Avenue, New York

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

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WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

- **Advertising, Street Car**
  - Collier, Inc., Barron G.
- **Air Circuit Breakers**
  - Roller-Smith Co.
- **Air Receivers & Aftercoolers**
  - Ingersoll-Rand Co.
- **Ammeters**
  - Roller-Smith Co.
- **Anchors, Guy**
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Armature Shop Tools**
  - Elec. Service Supplies Co.
- **Automatic Return Switch Stands**
  - Ramapo Ajax Corp
- **Automatic Safety Switch Stands**
  - Ramapo Ajax Corp.
- **Axles**
  - Associated Spicer Co.
  - Bemis Car Truck Co.
  - Bethlehem Steel Co.
  - Brill Co., The J. G.
  - Johnson & Co., J. R.
  - Laclede Steel Co.
  - Sheldon Axle & Spring Co.
  - St. Louis Car Co.
- **Axles, Front, Rear, Motor Truck & Passenger Car**
  - Associated Spicer Co.
  - Sheldon Axle & Spring Co.
- **Axles, Steel**
  - Carnegie Steel Co.
  - Laclede Steel Co.
- **Axles, Trailer Bus**
  - Associated Spicer Co.
  - Sheldon Axle & Spring Co.
- **Babbitt Metal**
  - Ajax Metal Company
- **Badges and Buttons**
  - Elec. Service Supplies Co.
  - Int. Register Co., The
- **Bearings and Bearing Metals**
  - Ajax Metal Company
  - Bemis Car Truck Co.
  - General Electric Co.
  - Gilbert & Sons B. F. Co., A.
  - More-Jones Brass & Metal Co.
  - St. Louis Car Co.
  - Westinghouse E. & M. Co.
- **Bearings, Center and Roller Side**
  - Stucki Co., A.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Elec. Service Supplies Co.
  - St. Louis Car Co.
- **Boilers**
  - Babcock & Wilcox Co.
- **Bond Testers**
  - Amer. Steel & Wire Co.
  - Elec. Service Supplies Co.
  - Roller-Smith Co.
- **Bonding Apparatus**
  - Amer. Steel & Wire Co.
  - Electric Railway Impt. Co.
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
- **Bonds, Rail**
  - Amer. Steel & Wire Co.
  - Electric Railway Impt. Co.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Page Steel & Wire Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
  - Westinghouse E. & M. Co.
- **Book Publishers**
  - McGraw-Hill Book Co.
- **Boxes, Switch**
  - Johns-Pratt Co.
- **Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)**
  - American Bridge Co.
  - Bates Expanded Steel Truss Co.
  - Electric Ry. Equipment Co.
  - Elec. Service Supplies Co.
  - Hubbard & Co.
  - Ohio Brass Co.
- **Brake Adjusters**
  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
- **Brake Shoes**
  - Ajax Metal Company
  - Amer. Br. Shoe & Fdy. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - St. Louis Car Co.
- **Brakes, Brake Systems and Brake Parts**
  - Allis-Chalmers Mfg. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - General Electric Co.
  - Johns-Manville, Inc.
  - National Brake Co.
  - St. Louis Car Co.
- **Brooms, Track, Steel or Rattan**
  - Paxson Co., J. W.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron, W. J.
  - Le Carbone Co.
  - Morganite Brush Co.
  - Westinghouse E. & M. Co.
- **Brushes, Graphite**
  - Morganite Brush Co.
- **Brushes, Wire, Pneumatic**
  - Ingersoll-Rand Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
- **Bulkheads**
  - Haskelite Mfg. Co.
- **Buses, Motor**
  - Brill Co., The J. G.
  - International Motor Co.
  - N. Y. Transportation Co.
  - St. Louis Car Co.
- **Bus Seats**
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
- **Bushings, Case Hardened and Manganese**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - St. Louis Car Co.
- **Cables (See Wires and Cables)**
- **Cambric Tapes, Yellow and Black Varnished**
  - Irvington Varnish & Ins. Co.
  - Mica Insulator Co.
- **Carbon Brushes (See Brushes, Carbon)**
- **Car Panel Safety Switches**
  - Westinghouse E. & M. Co.
- **Cars, Dump**
  - Differential Steel Car Co.
  - St. Louis Car Co.
- **Car Lighting Fixtures**
  - Elec. Service Supplies Co.
- **Car Panel Safety Switches**
  - Consolidated Car Heat'g Co.
  - Westinghouse E. & M. Co.
- **Cars, Passenger, Freight, Express, etc.**
  - Amer. Car Co.
  - Brill Co., The J. G.
  - Kuhlman Car Co., G. C.
  - McGuire-Cummings Mfg. Co.
  - National Ry. Appliance Co.
  - St. Louis Car Co.
  - Wason Mfg. Co.
- **Cars, Gas Rail**
  - St. Louis Car Co.
- **Cars, Self-Propelled**
  - General Electric Co.
- **Car Wheels, Rolled Steel**
  - Bethlehem Steel Co.
- **Castings, Brass, Composition or Copper**
  - Ajax Metal Company
  - Anderson Mfg. Co., A. & J. M.
  - More-Jones Brass & Metal Co.
- **Castings, Gray Iron and Steel**
  - Bemis Car Truck Co.
  - St. Louis Car Co.
- **Castings, Malleable and Brass**
  - Amer. Br. Shoe & Fdy. Co.
  - Bemis Car Truck Co.
  - St. Louis Car Co.
- **Catchers and Retrievers, Trolley**
  - Earll, C. I.
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
  - Wood Co., Chas. N.
- **Catenary Construction**
  - Archbold-Brady Co.
- **Change Carriers**
  - Cleveland Fare Box Co.
- **Circuit-Breakers**
  - General Electric Co.
  - Roller-Smith Co.
  - Westinghouse E. & M. Co.
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co., A. & J. M.
  - Dossert & Co.
  - Elec. Ry. Equipment Co.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
  - St. Louis Car Co.
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  - General Electric Co.
- **Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- **Coil Banding and Winding Machines**
  - Elec. Service Supplies Co.
- **Coils, Armature and Field**
  - General Electric Co.
  - Westinghouse E. & M. Co.
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  - General Electric Co.
  - Westinghouse E. & M. Co.
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  - Intern'l Register Co.
  - Johnson Fare Box Co.
- **Coin Sorting Machines**
  - Cleveland Fare Box Co.
- **Coin Wrappers**
  - Cleveland Fare Box Co.
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  - Elec. Service Supplies Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutators or Parts**
  - Cameron Elec'l Mfg. Co.
  - General Electric Co.
  - Mica Insulator Co.
  - Westinghouse E. & M. Co.
- **Compounds (Insulating & Splicing)**
  - Johns-Manville, Inc.
- **Compressors, Air**
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  - Ingersoll-Rand Co.
  - Sullivan Machinery Co.
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- **Compressors, Air Portable**
  - Ingersoll-Rand Co.
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- **Compressors, Gas**
  - Sullivan Machinery Co.
- **Condensers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
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  - Westinghouse E. & M. Co.
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  - Irvington Varnish & Ins. Co.
- **Connectors, Solderless**
  - Dossert & Co.
  - Westinghouse E. & M. Co.
- **Connectors, Trailer Car**
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
- **Controllers or Parts**
  - General Electric Co.
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  - Elec. Service Supplies Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Converters, Rotary**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Conveying and Hoisting Machinery**
  - Columbia M. W. & M. I. Co.
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  - Anaconda Copper Mining Co.
  - Page Steel & Wire Co.
- **Cord, Bell, Trolley, Register**
  - Brill Co., The J. G.
  - Elec. Service Supplies Co.
  - Internat'l Register Co., The
  - Roebling's Sons Co., J. A.
  - St. Louis Car Co.
  - Samson Cordage Works
  - Silver Lake Co.
- **Cord Connectors and Couplers**
  - Elec. Service Supplies Co.
  - Samson Cordage Works
  - Wood Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Ohio Brass Co.
  - St. Louis Car Co.
  - Westinghouse Tr. Br. Co.
- **Cranes**
  - Allis-Chalmers Mfg. Co.
  - Industrial Works
- **Cranes, Gas or Electric**
  - Industrial Works
- **Cranes, Locomotive, Motor Truck & Portable**
  - Industrial Works
- **Cross Arms (See Brackets)**
- **Crossing Foundations**
  - International Steel Tie Co.
- **Crossings**
  - Ramapo Ajax Corp.
- **Crossing Signals (See Signals, Crossing)**
- **Crossing, Frog & Switch**
  - Ramapo Ajax Corp.
- **Crossing Manganese**
  - Bethlehem Steel Co.
  - Ramapo Ajax Corp.
- **Crossings, Track (See Track, Special Work)**
- **Crossings, Trolley**
  - Anderson Mfg. Co., A.&J. M.
  - Ohio Brass Co.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Elec. Service Supplies Co.
  - Morton Mfg. Co.
  - St. Louis Car Co.
- **Dealer's Machinery**
  - Elec. Equipment Co.
  - Transit Equip. Co.
- **Derailing Devices (See also Track Work)**
  - Wharton, Jr., & Co., Wm.
- **Derailing Switches, Tee Rail**
  - Ramapo Ajax Corp.
- **Detective Service**
  - Wish-Service, P. Edward
- **Doors & Door Fixtures**
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  - St. Louis Car Co.
- **Door Operating Devices**
  - Brill Co., The J. G.
  - General Electric Co.
  - Nat'l Pneumatic Co., Inc.
- **Doors, Folding Vestibule**
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- **Drills, Rock**
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  - Elec. Service Sup. Co.
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  - Ford, Bacon & Davis
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  - Jackson, Walter
  - Kelly-Cooke & Co.
  - Ong, Joe R.
  - Railway Audit & Inspection Co.
  - Richey, Albert S.
  - Robinson & Co., D. P.
  - Sanderson & Porter
  - Stevens & Wood, Inc.
  - Stone & Webster
  - White Eng. Corp., The J. G
  - Wortham, Edwin
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  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
  - Westinghouse E & M. Co.
- **Exterior Side Panels**
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  - Cleveland Fare Box Co.
  - Johnson Fare Box Co.
  - Nat'l Ry. Appliance Co.
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  - Amer. Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Consolidated Car Fender Co.
  - Elec. Service Supplies Co.
  - St. Louis Car Co.
  - Star Brass Works
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  - Johns-Manville, Inc.
  - Westinghouse E. & M. Co.
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- **Fire Extinguishers**
  - Johns-Manville, Inc.
- **Flangeway Guards, Steel**
  - Godwin Co., Inc., W. S.
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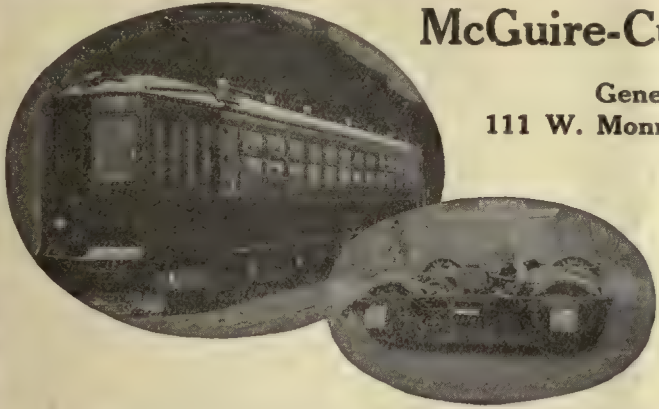

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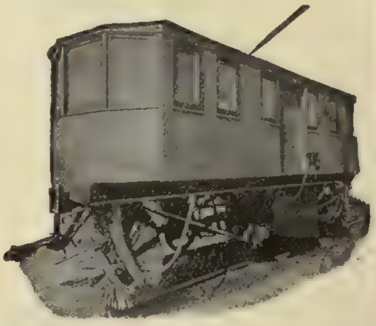

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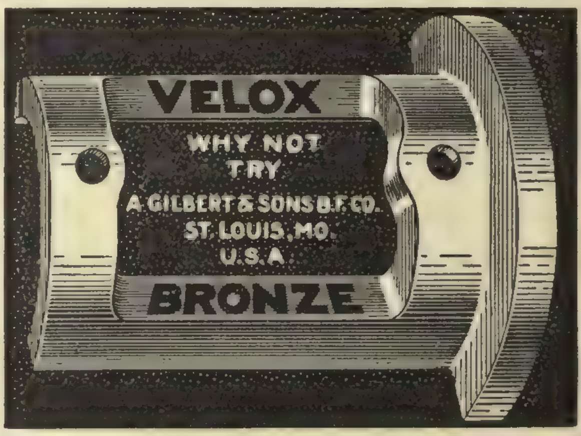

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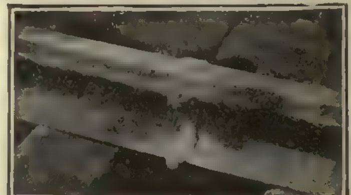

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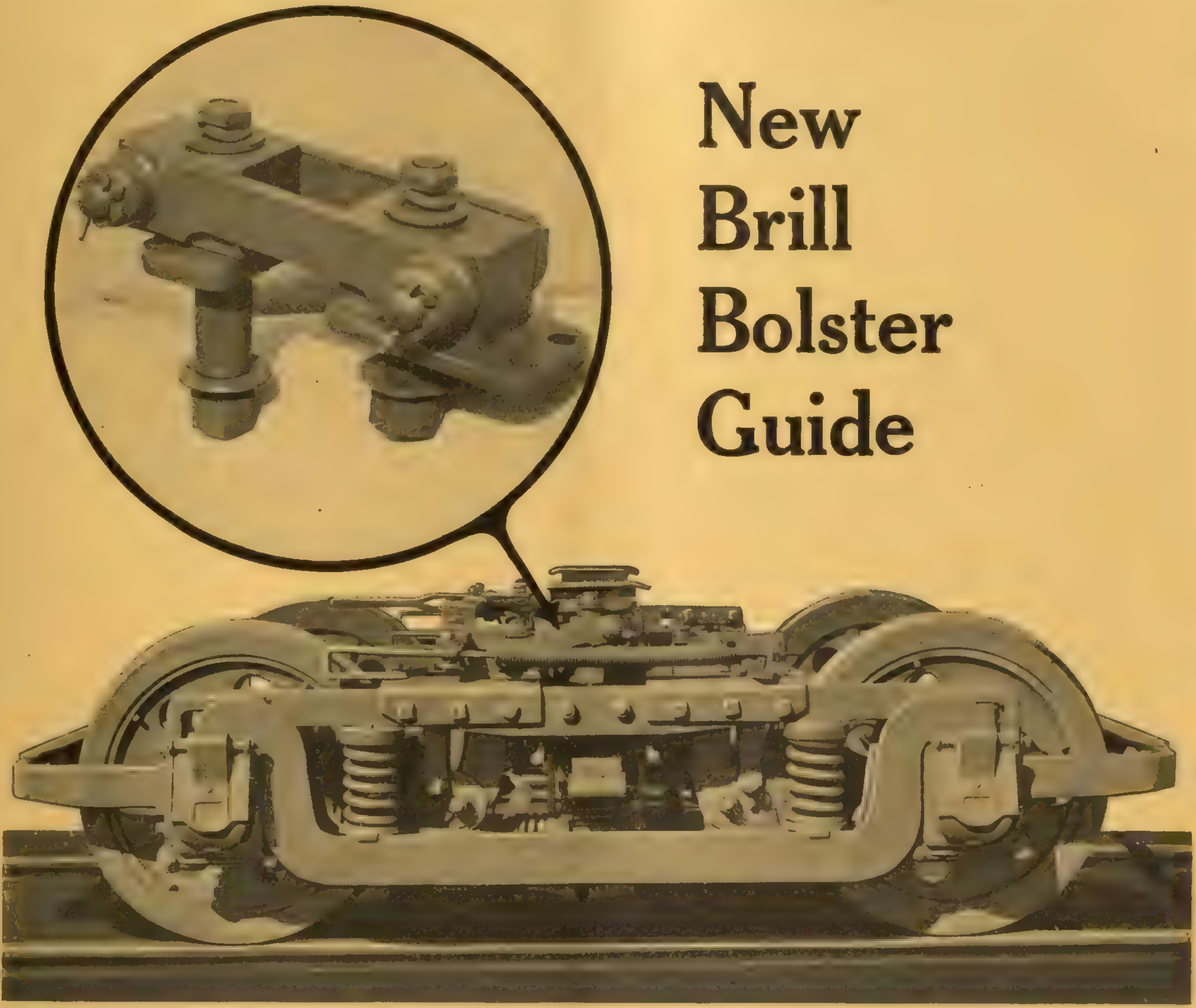

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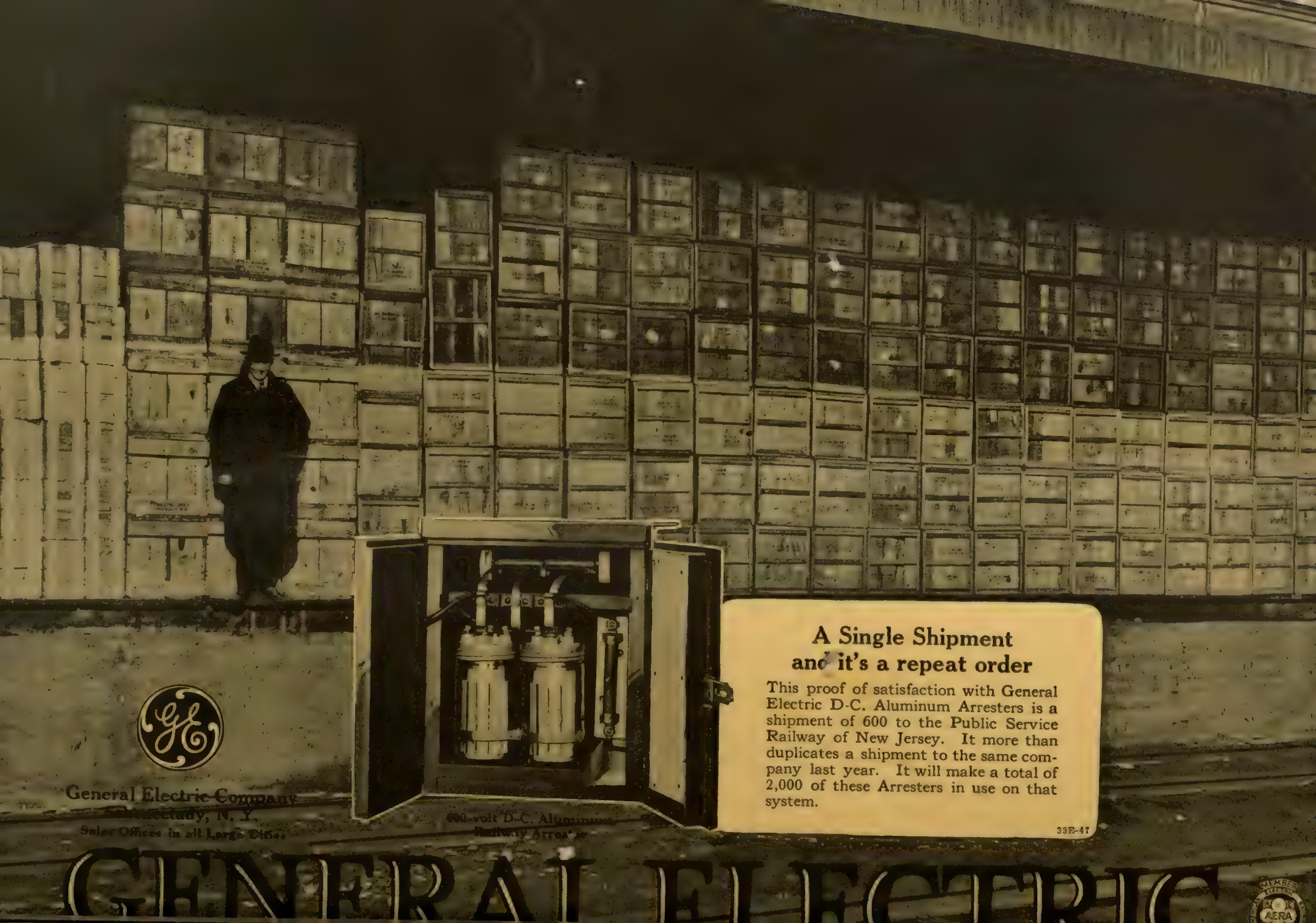

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

Reprints

THE ever-growing interest shown in the work that the ELECTRIC RAILWAY JOURNAL is doing is indicated by the steady increase during the past eighteen months in the number of requests for reprints of articles that have appeared in the paper.

The number of such articles reprinted from the pages of the JOURNAL during 1923 was more than twice as great as in the preceding year. That the interest taken in the reading matter furnished in the columns of the paper has not shown any sign of slackening is shown by a further increase in requests for reprints during the present year. At the end of June of this year requests for such reprints had exceeded the number received in the entire year 1922 by 50 per cent.

While the JOURNAL reaches weekly practically all persons whose interests center primarily in the electric railway industry, the value of the reprints is to place before a selected list of readers the information in the form of monographs on which they can focus their attention. Then, too, the author is able to reach a group of readers interested in some particular phase of the business, who ordinarily might not be subscribers to the paper. In this way the regular subscription list of the JOURNAL is expanded greatly as regards certain articles which are selected by their authors for the additional circulation.

Number of Copies Printed, 6,150 Advertising Index—Alphabetical, 38; Classified, 34, 36; Searchlight Section, 33

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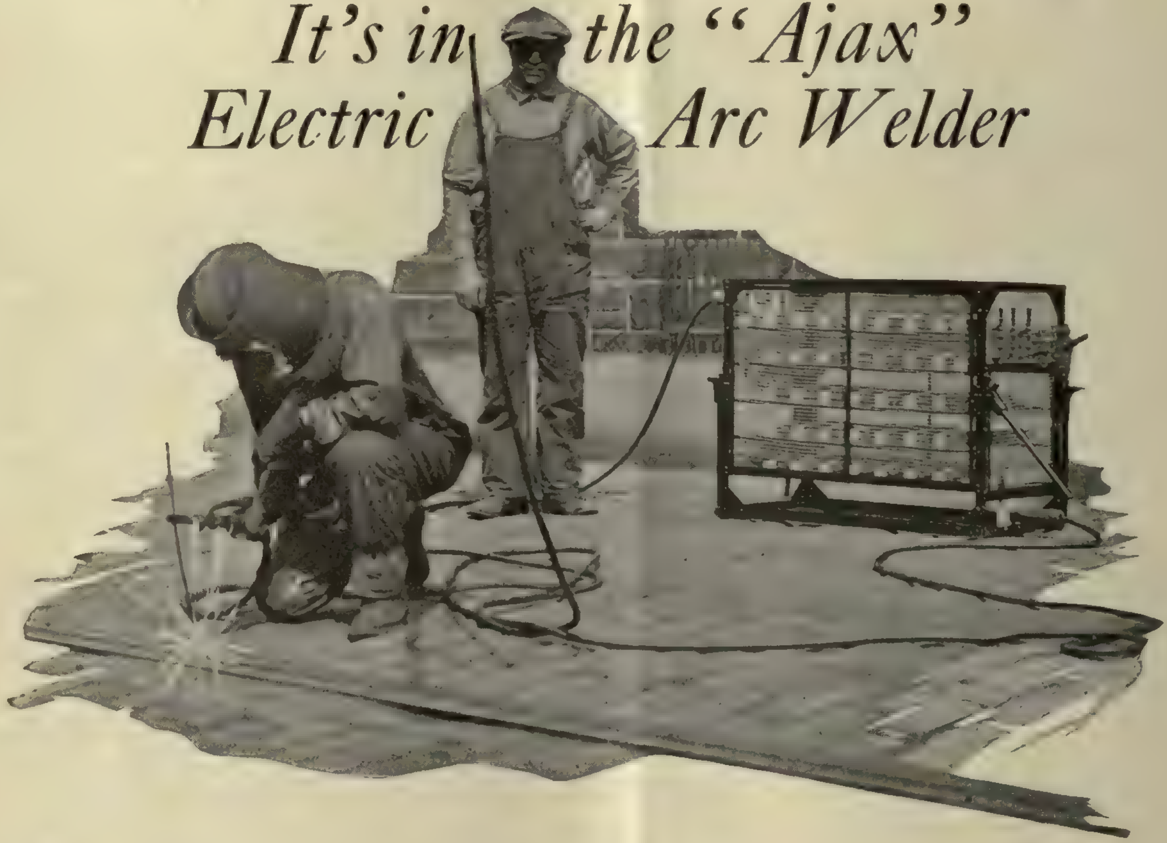
It's in the "Ajax" Electric Arc Welder



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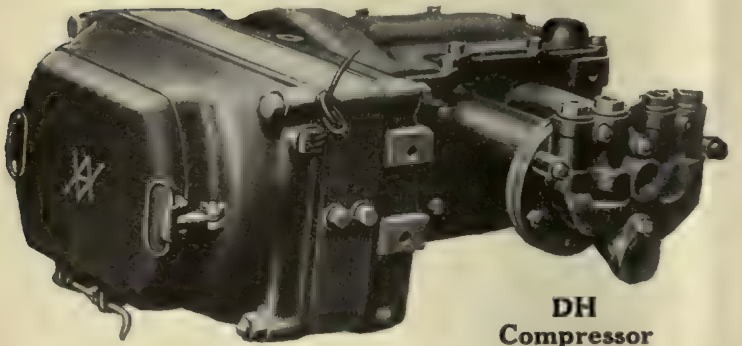

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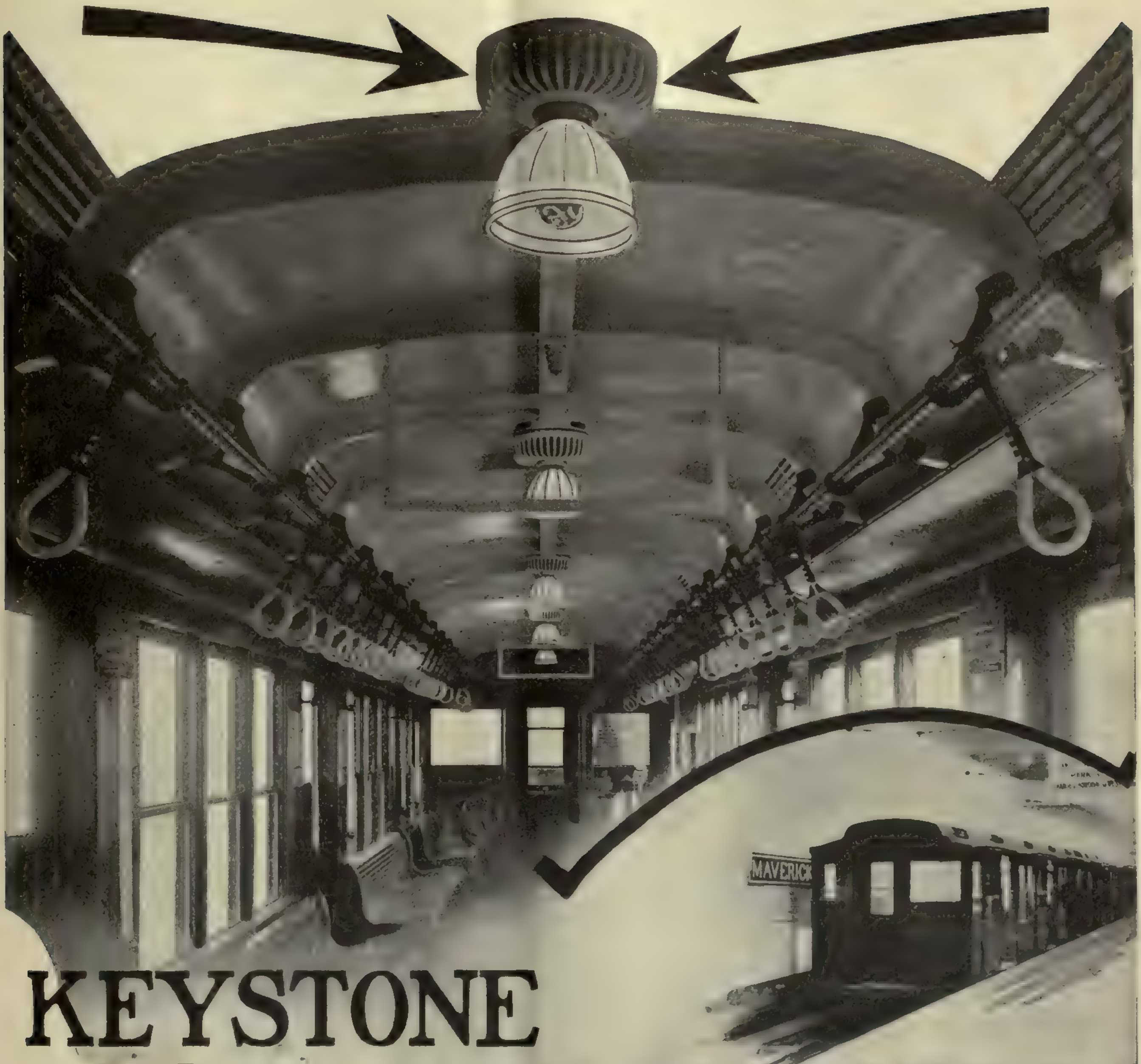

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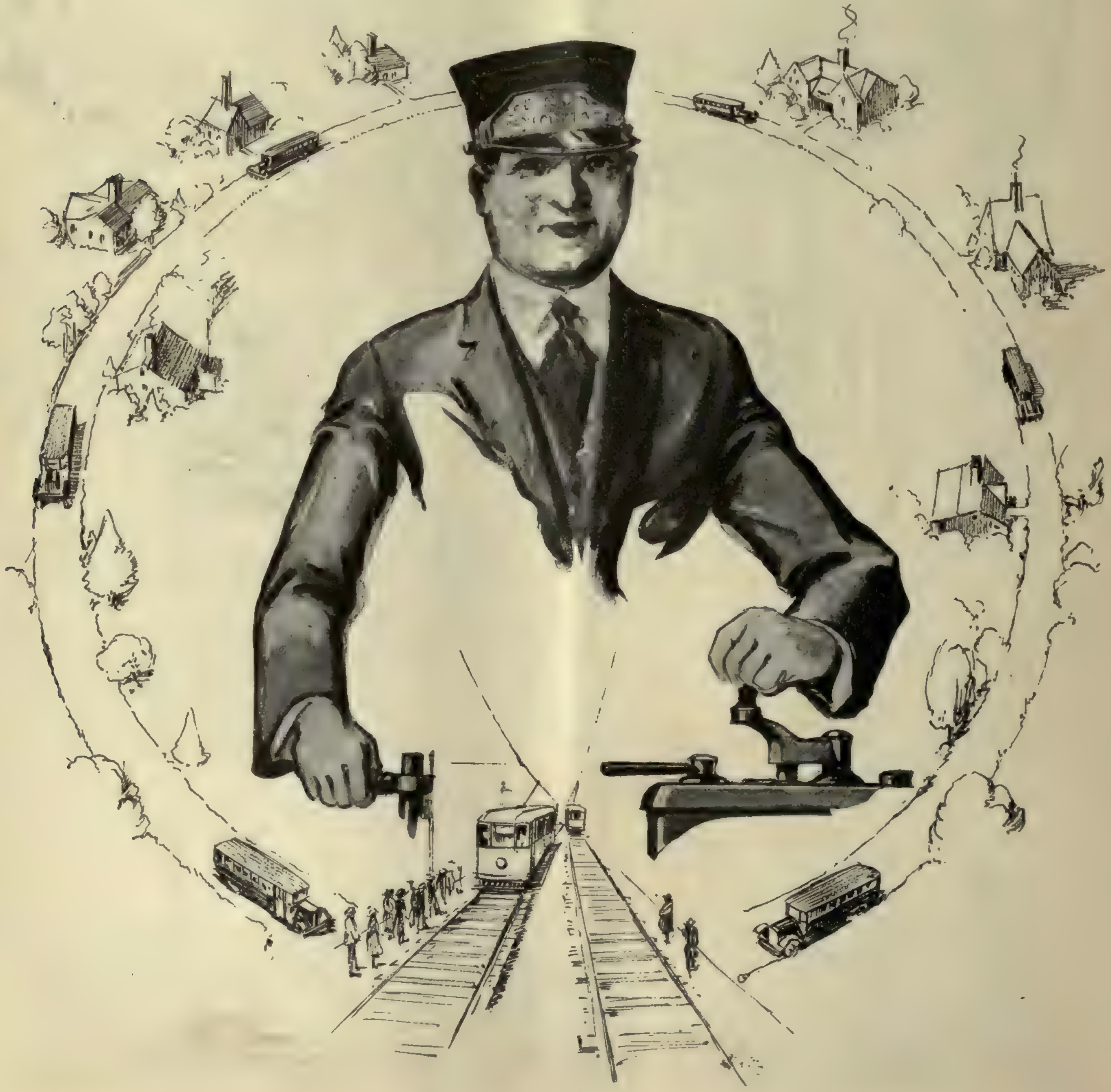

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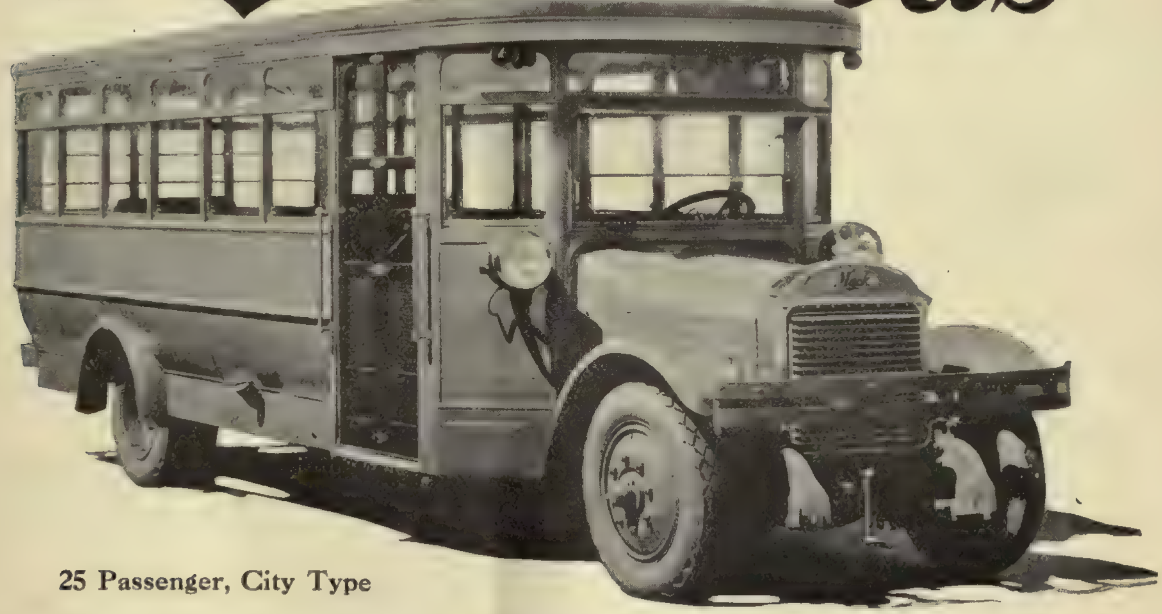

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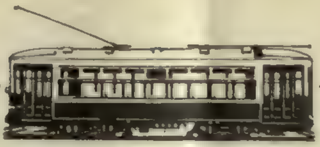

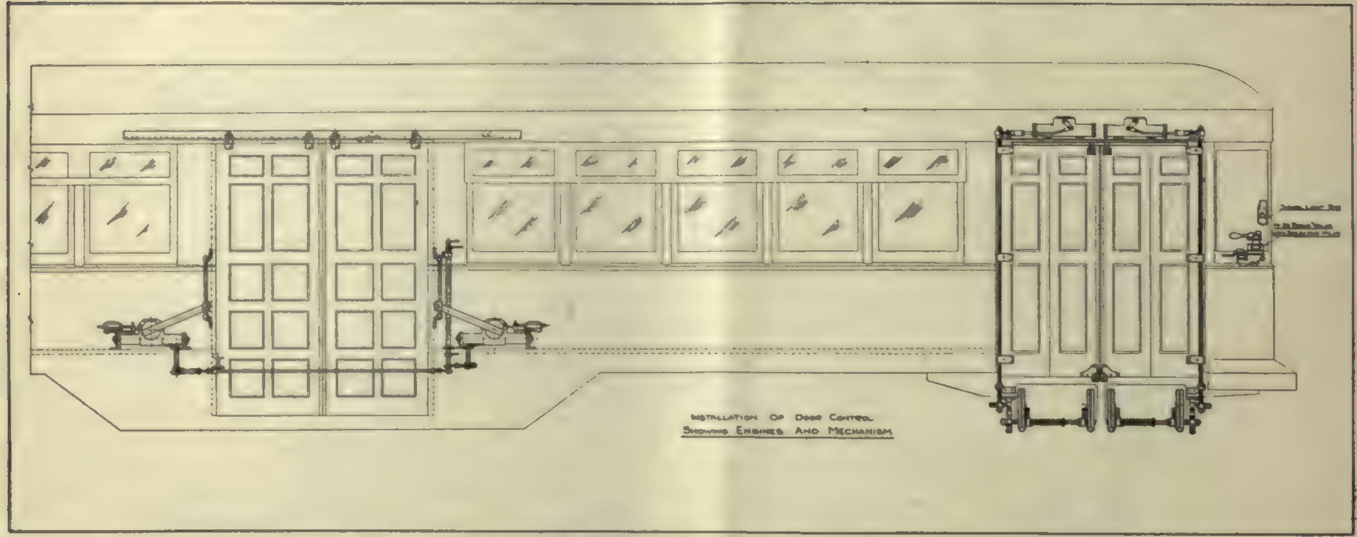

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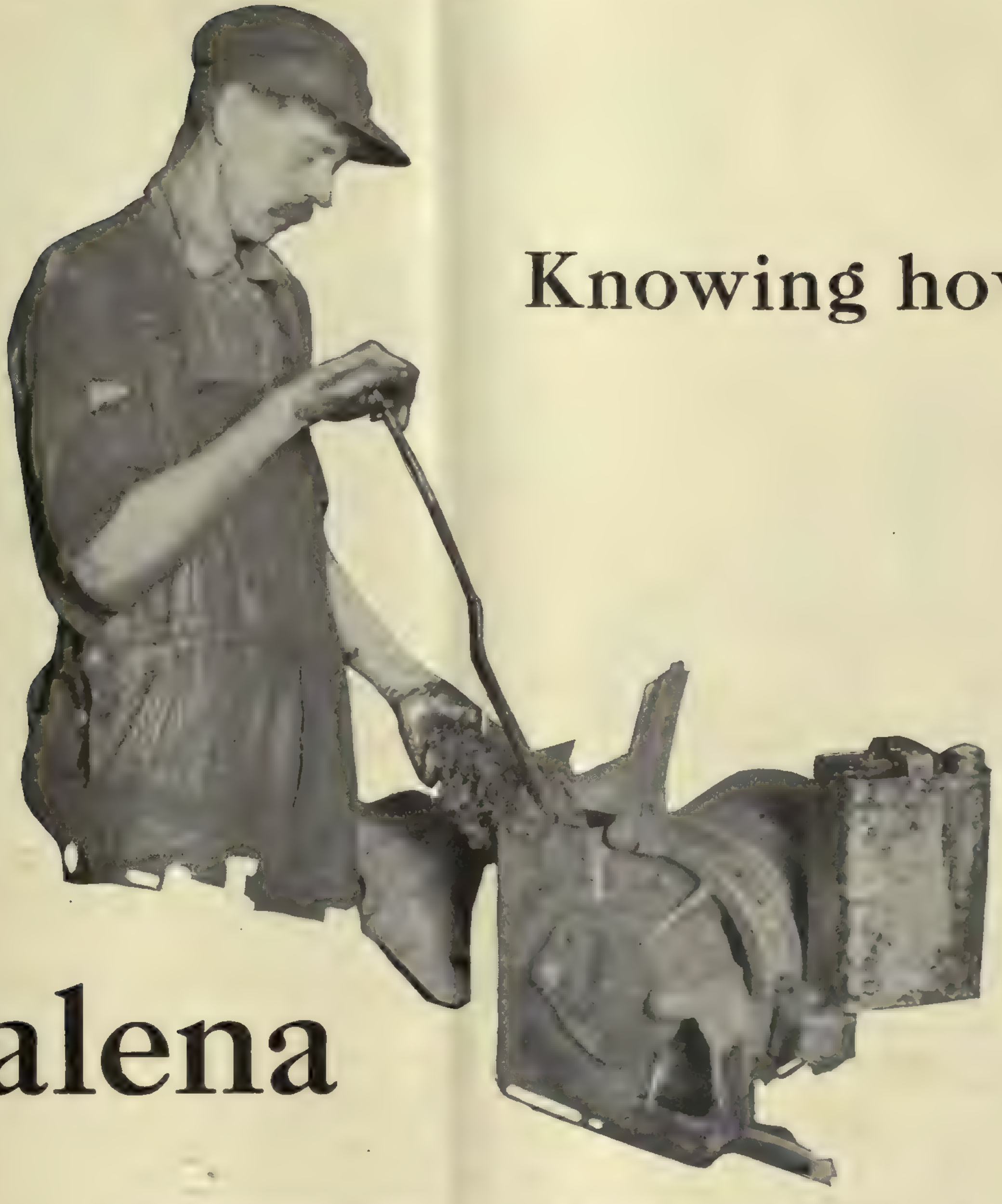

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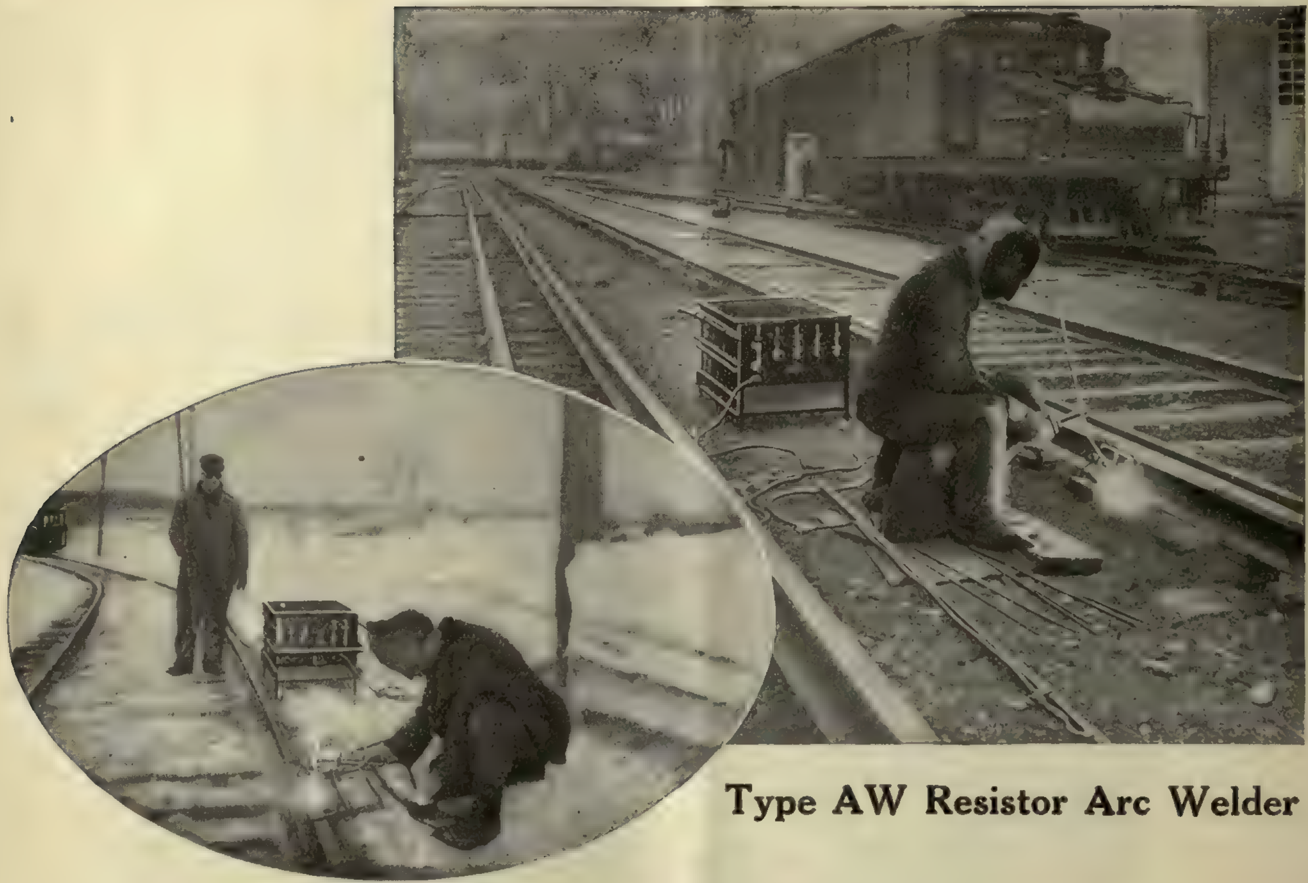

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Volume 64
Number 4

Traction Sunshine from San Diego

WHEN in the year 1924 two newspapers in a city of 100,000 inhabitants can find material for a 32-page story each of another step in the growth of an electric railway it deserves attention. How does it come about that the San Diego Electric Railway had the temerity in the most southerly part of winterless California to inaugurate the $3,500,000 improvement described in the local papers this first of July? Doesn't the management read the automotive prophecies?

Right there is the most interesting part of the story. The balmy climate of San Diego all the year round, the fine roads and the high proportion of persons with ample leisure brought the automobile an ideal market long before railways in less fortunate climes gave rubber-tire competition the slightest attention. Jitney depredations also made serious inroads on the traction revenue years before it was known in the East. From these facts it is clear that the experiences of the San Diego company with automotive competition are a goodly step ahead of the general run of the industry.

San Diego did not meet the situation by lying down and moaning for help. By continuing to improve its service despite jitney competition, the railway placed itself in a strong moral position to demand and secure the elimination of these pests. Next, their return was automatically prevented by the introduction of a genuine zone-fare system that assured a 5-cent fare to practically half the public and for distances liberal enough to meet almost all voluntary riding, as for shopping and pleasure purposes.

But the increasing number of all-year automobiles made it necessary to use still more progressive measures to stop the decline in the car-riding habit. Cars were bought or refitted for one-man operation to permit more service at less cost. Express runs were introduced to cut running time and give the passenger the smoother riding of non-stop operation. While some other railways still continued to denounce buses, the San Diego management voluntarily assumed the operation of both buses and coaches as a proper obligation to its public. Then, studying the wishes and convenience of its customers still further, the company supplemented its successful zone-fare operation by equally successful use of the weekly pass on both city and suburban routes.

All this was going on in a city which had no great industrial plants to assure a steady income to the railway. Even the most prejudiced citizens could see that the management was displaying a praiseworthy civic spirit in establishing such high standards. The effect of all these improvements was soon manifested at an election in which the company received substantial relief in paving and the granting of more liberal franchises, with freight and express privileges included.

As this approval of the public was also backed by substantial increases in revenue and riding, the company felt encouraged to carry out the construction of a high-speed extension to the series of beaches terminating at La Jolla, 14 miles from San Diego. Catenary construction of durable type, cars with the latest automatic refinements, substations of noble Egyptian design—these are but part of the work.

Truly, San Diego has sunshine and lots of it. But one of the best kinds is its traction sunshine. Here are light and warmth and direction for those who have not earned the faith of the public because they lack faith in themselves and in their tools.

Financing of a Modernization Program that Should Inspire Others

THAT much can be accomplished by a wisely directed determination to carry out a program of modernization in the face of what appeared like insurmountable financial obstacles was shown by the recently completed re-equipment of the Indianapolis & Cincinnati Traction Company. Here the possibility of raising nearly a million dollars of new capital to carry out the work of changing over from single-phase to direct-current operation and at the same time purchasing entirely new rolling stock seemed indeed remote. Many who studied the situation considered it impossible.

The necessary money was finally raised by extending the use of the now well-known equipment trust method of financing to the purchase of substation and feeder equipment as well as rolling stock. The essential departure from ordinary practice was the use of this method for financing structures which, unlike rolling stock, are permanently tied up with the real property upon which they are erected. This obstacle to the equipment trust method was overcome by purchasing new sites for substation buildings off the railway right-of-way and taking title to the real estate in the name of the equipment trust.

Of course it is true that in the case of this company's financing, the project could not have been carried out without the co-operation of certain important creditors of the company, who agreed to take junior securities of the new equipment trust company to the extent of 20 per cent of the total amount required, in order that the remaining securities might be made salable. Even with this favorable condition, which might not apply on another road faced with similar problems, the project was only carried out as the result of perseverance and the determination to find a solution.

Modernization programs will only get into full swing generally in the industry when this same frame of mind becomes common. The problem of raising new funds is a serious one on many roads, it is true, but the results accomplished by the I. & C. should be an inspiration to others in carrying out similar programs.

We Can Derive Much Benefit from a Study of Foreign Practice

TO SOME people Europe seems far away. What can American electric railway managers learn from another continent, they say? The conditions are very dissimilar to those in this country. The streets are narrow. The rides are short. The systems are circumscribed in extent. The customs of the people are not like those of our public. The currency and the methods of paying fare are different.

All these statements may be true—at least in part. Nevertheless, it is also true that human nature is about the same the world over, and it is equally certain that two large groups, each studying the same problems, should be able to contribute some information of value to the other. This is particularly true in the case of electric railway development, because for various reasons development of electric railways on both sides of the Atlantic has followed along pretty closely the same lines. One of these is the comparative newness of the industry, so that there have been few preconceived ideas to change. Another is that most of the electrical equipment for the roads throughout the world has been supplied by a very few manufacturing companies, so that there has been an inducement to standardization. Still another reason probably is the familiarity of operators abroad with American electric railway practice through visits to this country and also —though said with modesty—through the printed accounts which have appeared in this paper.

Each continent has, therefore, benefited through the study placed on railway problems by the other. The list of methods and practices for which we are indebted to Europe is a long one. To mention only a few, such a list would include the general use of interpole motors for railway work, stanchions in cars instead of handstraps or handholds for standing passengers, the general use of apparatus on the car for measuring the energy consumption of individual motormen, and developments in joint construction, such as thermit and some phases of the welded joint. Even the principle of prepayment, by which the conductor remains in one place and receives the fares of passengers as they pass by him, instead of making the circuit of the car to collect these fares, was developed outside of the United States, even though it originated on this continent.

This emphasizes the advantage which will accrue to the industry from the study on European conditions of the committee of the American Electric Railway Association, now abroad.

The Conductorette of Yesteryear

RECENT word from St. Louis telling about the original squad of fifty-two conductorettes being reduced to a band of ten recalls to mind the short careers of those energetic women who tried their hands at railway work when the call to a higher duty had depleted appreciably the ranks of the masculine workers. These pioneers "carried on" with such satisfactory results that the Bulletin of the Women's Bureau published in 1921 stated that woman's success in this endeavor was likely to insure another permanently open field for work for women. But experience showed that this prophecy was too optimistic. Today in New York, Chicago, Detroit and Kansas City the job of fare collecting is left almost exclusively to men despite the fact that in August, 1918, the Detroit United Railway employed approximately 300 women and that in December, 1918, the Kansas City Railways employed 150 women.

The causes which led to the disappearance of the woman conductor are partly within the industry and partly without. Altogether, it was perhaps a logical conclusion for the women to pass out of this phase of electric railway work in spite of the many good qualities which experience shows that they possessed for it.

Exclusiveness for Rochestrians at Fifty Cents a Day

SIGNIFICANT news often is tucked away in items that at first glance appear to be remote in their general bearing on events. Thus, in last week's issue reference was made to the proposal to start a de luxe bus service in Rochester by a subsidiary of the local electric railway company. There is nothing particularly new in the idea of a de luxe bus service furnished by a railway. Any number of electric railways are operating services of this kind, particularly on interurban runs, notably the Eastern Massachusetts Street Railway, the Chicago, North Shore & Milwaukee Railroad, Columbus, Newark & Zanesville Electric Railway, to mention just a few. The Rochester proposal, however, does appear to differ from most of the other similar projects in several particulars. First of all, the residents of an exclusive suburban development solicited the railway to establish the new line. Second, both the fare for the run and the proposed type of vehicle to be used deserve attention. The fare will be 25 cents each way for a 3¾-mile trip. Each vehicle will accommodate only sixteen persons. No stops will be made between Brownsville and East Avenue and Main Street, Rochester.

Here are luxury and exclusiveness. If the project is put through, and there appears to be little doubt that it will materialize, business and professional men will be able to ride into and out of Rochester in a public conveyance almost as exclusive as their own cars, while they pull on their panetelas with nary a concern on their part about avoiding passing pedestrians or any need on their part to tell James what he shall do with the car or where they themselves shall park it, or whether it will be safe where it is left to stand in the public street. Moreover, matrons and maids, by making judicious use of the new service, will be better able to do their daily chores and to meet their social obligations. But Rochester will have to be on guard. By and large, the wish is proclaimed not to lose the common touch, but at heart all yearn for things that are exclusive. Will the regular patron for whom the proposed service is primarily intended be inclined to resent the presence of the occasional patron? Will he look upon the transient as an interloper or an intimate?

All these things aside—and the suggestions contained in some of them are not so far-fetched as they seem—the ramifications of the proposal are almost countless. It was made seriously and it will be taken seriously. The bus is a versatile vehicle. It remains to be seen, however, how the city will look upon a proposal to operate non-stop buses over the city streets for the exclusive use of people of a particular community. It is to be hoped that the residents of Rochester's suburbs will be successful in their appeal, as the experiment with a service such as has been suggested deserves to be made.

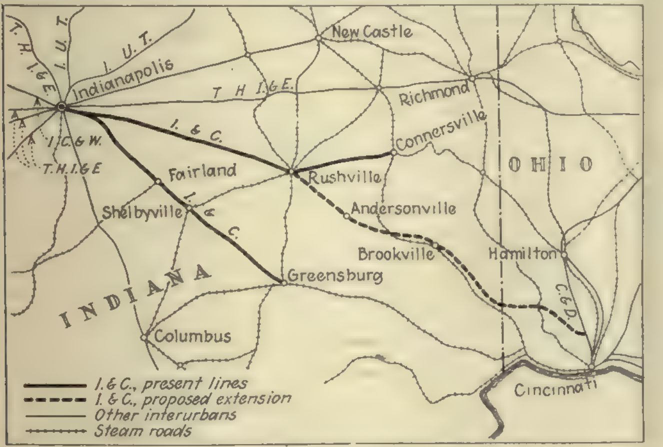
How the Indianapolis & Cincinnati Line Was Rehabilitated

First Article

This, the First of a Series of Three Articles, Describes the Methods Used for Power Supply with Purchased Energy—The Original High-Tension Lines Were Used with Certain Modifications—It Is Estimated the Savings from the Installation Will Pay Its Cost in Ten Years

RE-EQUIPMENT of the Indianapolis & Cincinnati Traction Company's lines for operation on a 600-volt, direct-current, instead of the 3,300-volt, alternating-current system formerly in use, has been completed. Both divisions of the property are now operating on direct current. This change was decided upon as a means of decreasing operating and maintenance costs and at the same time improving the reliability and comfort of the road's service. An analysis of President Charles L. Henry's study of the economics of the problem, which was confirmed in a report by Prof. Albert S. Richey of Worcester Polytechnic Institute, was published in the ELECTRIC RAILWAY JOURNAL of June 2, 1923.

Substantial reductions in operating and maintenance costs were shown to be possible through the adoption of the direct-current system of operation, cars of lighter weight, equipped with modern apparatus, and the purchase of three-phase power. These savings may be attributable to the development in d.c. motor and substation apparatus, which, since the construction of the line of the Indianapolis & Cincinnati Traction Company, has been rapid.



The Indianapolis & Cincinnati Traction Company's Property Consists of Two Divisions Which Run Southeast from Indianapolis, Totaling Approximately 160 Miles of Line

Another factor in favor of the change was the increase in number of interruptions to service caused by failures in the well-worn single-phase car equipment. This condition, combined with the relatively retarded engineering development of single-phase car equipment suitable to interurban operation, gave a high replacement and maintenance cost and made consideration of methods of accomplishing a change to d.c. operation vital to the continuation of the road.

For many years the Indianapolis & Cincinnati road had looked forward to an entrance into the city of Cincinnati. Prospects for the ultimate accomplishment of this object became much brighter with the active development of the new rapid transit loop by the city of Cincinnati, and with this prospect coming again into sight, it became imperative that the subject of the future type of equipment be settled as soon as possible. Once the d.c. system was decided upon, 600 volts followed almost as a matter of course because of terminal operation over city lines where this voltage is used, and also because of the advantages of standardization with the other connecting interurban properties in the highly developed network of lines comprising the central interurban territory and covering the states of Indiana, Ohio and Michigan.

FINANCIAL OBSTACLES OVERCOME

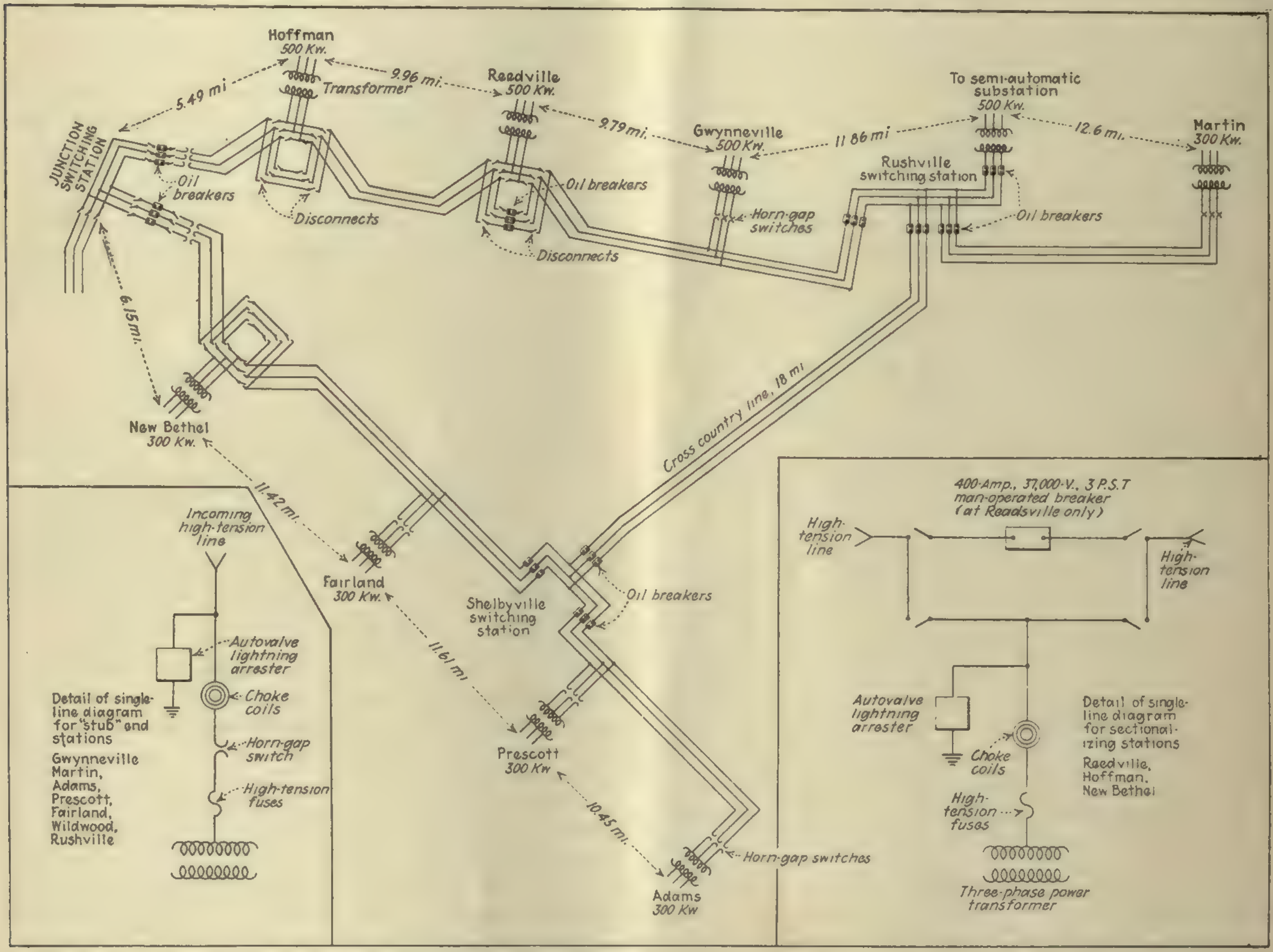
Finances presented an obstacle which was considered insurmountable by many who analyzed the situation. A plan, however, was finally devised by President Henry for extending the principles of the equipment trust method commonly used for financing the purchase of rolling stock to include substation equipment and feeder lines as well. J. F. Wild & Company, a local investment banking firm, agreed to finance the project on the basis of such an equipment trust through the sale of securities to the amount of 80 per cent of the total required, provided that the remaining 20 per cent could be raised in such a way that these securities became a first lien on the total amount of the trust equipment. The necessary additional 20 per cent was advanced by a small group of bondholders of the road who had faith in the ultimate result of the improvement and agreed to accept a second lien as security, in order to make the improvement possible. Preferred stock paying 6 per cent was issued by an intermediate company through which the details of the matter were arranged. The stock comprises two series, covering the 80 per cent first lien and the 20 per cent second lien, respectively. These securities were all handled on a 10 per cent brokerage basis, and the total funds required were banked before any orders were placed with the manufacturers.

Extension of the equipment trust method of financing to the purchase of substation and feeder equipment made it important to avoid any questions or complications as to title to substation buildings or equipment. This was done by purchasing land sites adjacent to the railway right-of-way for the erection of the substation buildings. Although each of the new stations adjoins an old transformer station which was suitable physically for conversion into a rotary converter substation, the question of complication in title made it desirable to adopt the plan of purchasing sites off existing railway property and erecting new buildings. However, by making the new structures as simple as possible, consistent with security and fireproof construction, the total cost of land and buildings was held to within $20,000 of the estimated cost of making changes in existing transformer station buildings.

All feeder cable strung along the right-of-way on the railway's poles, as well as other property purchased with equipment trust funds, was plainly tagged at frequent intervals for identification.

SAVINGS TO PAY COST IN TEN YEARS

Annual rental and installment payments by the railway are to be made at a rate which will wipe out the total cost of the new equipment at the end of ten years.



The Loop Arrangement of the High-Tension System Gives Protection Against Interruptions to Service. In the Event of Trouble the Line May Be Sectionalized at a Number of Points

Engineering estimates of the saving in cost of power and the reduction in cost of operation and maintenance to be expected showed that the savings would fully meet all these payments without relying in any way upon the anticipated increased earnings from the improved service. Title to land sites for new substation buildings was taken in the name of the equipment trust company, and will be held in escrow until the expiration of the contract, whereupon these titles will pass to the Indianapolis & Cincinnati Traction Company.

In considering power requirements for the re-equipped property, two courses of procedure were open. One involved the installation of frequency changing equipment in the Rushville power house of the traction company, which consisted of three-phase, 2,300-volt, engine-driven alternators connected to step-up transformers, which delivered from their secondaries single-phase, 25-cycle, 33,000-volt power to the transmission lines. The other alternative was to purchase energy from a neighboring power company. The latter course was adopted because of the saving which could be made in the cost of power, due to the small size of the railway company's station. A contract was made with the Terre Haute, Indianapolis & Eastern Traction Company for power delivered to the Junction switching station about 4 miles out of the terminal at Indianapolis, at the point where the two divisions of the railway company separate. This power is supplied at 33,000 volts, 60 cycles, from the West Tenth Street plant of the T. H., I. & E., where a frequency changer is used to obtain 60 cycles from a 25-cycle generating plant. The contract is based on a flat rate of 1.3 cents per kilowatt-hour delivered to the railway company's junction switching station. From this point into the Indianapolis terminal, the cars of the Indianapolis & Cincinnati Traction Company are operated 1⅛ miles over its own tracks, and for the remaining distance, approximately 2⅞ miles to the terminal, they operate over the tracks of the Indianapolis Street Railway.

Plans for the future contemplate utilizing the present power house buildings at Rushville for increased shop facilities. The present engine room is well lighted and is of ample dimensions to provide liberal space for a machine shop and armature room. In addition, it is planned to convert the present boiler room into a car repair shop.

NEW OUTDOOR SWITCHING STATION

The I. & C. switching station at the junction is an outdoor installation, with two sets of high-tension, three-phase oil switches, disconnects, and horn-gap breaks. At this point the purchased energy is metered with independent instruments by both the power company and the traction company. In addition, maximum demand meters will be installed by the latter, in order to analyze the characteristics of the service and determine the relative advantages of the flat rate as compared with the corresponding cost of power under a maximum demand charge contract. All new cars are being equipped with Economy watt-hour meters to give a further check on power requirements, and at the same time stimulate trainmen to save energy in the operation of the equipment.

At the junction the high-tension lines are sectionalized into two main sections, corresponding with the two divisions of the railway. These consist of one route between Indianapolis and Connersville, 58 miles long, and a second line from Indianapolis to Greensburg, 49 miles long. Both divisions run together southeast from the Indianapolis terminal to the junction, 4 miles distant. At this point the lines divide, that to Shelbyville and Greensburg swinging considerably south of the line to Rushville and Connersville.

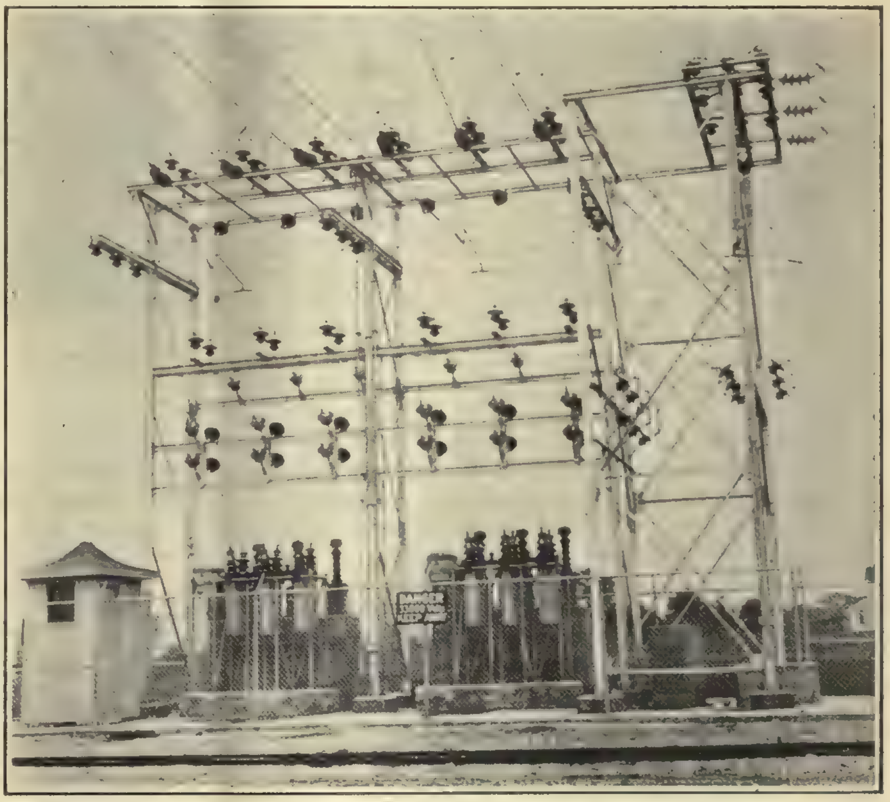
Previous to the beginning of the reconstruction program, the 33,000-volt power supply had been transmitted from the Rushville power plant to each transformer substation over independent two-wire single-phase lines. To feed the Greensburg division from the Rushville plant, a cross-country line approximately 20 miles long was extended from Rushville to Shelbyville, as shown on the accompanying diagram. This consisted of two independent single-phase lines of two wires each extending between the power plant at Rushville and a switching station at Shelbyville. These four high-tension wires were carried through single-pole oil switches to a high-tension bus in the Shelbyville station. From this point, independent single-phase lines of two wires each passed through outgoing single-pole oil switches to each of the four transformer stations on the Greensburg division, two east and two west of Shelbyville. East from Shelbyville the first of these stations was Prescott, and the second was at Adams. West from Shelbyville, the first station was Fairland and the second Wildwood. These points became the locations for new automatic control, rotary converter substations.

Similar individual transmission lines extended from the Rushville power house to the original transformer stations on the Rushville division. East from Rushville two wires carried a single-phase line to Martin, located between Rushville and Connersville. Similarly, in order to supply transformer stations at Gwynneville, Reedville and Hoffman, west from Rushville, six high-tension wires extended from the power house to the first station, four to the second and two to the furthest, which was Hoffman.

ORIGINAL HIGH-TENSION LINES UTILIZED

The original high-tension system was all insulated for 33,000 volts. This current was delivered to the transformer substations, where it was stepped down to 3,300 volts and put on the catenary trolley at that voltage.

Since the construction and insulation of the high-tension lines was entirely suitable for the new transmission system, the existing switching and distribution apparatus and lines were utilized as far as possible. Surplus material was removed from points where it was not required, and if suitable, was used again at other points on the system where existing facilities were not sufficient. This was particularly true of high-tension lines. Where more than three wires were available between old transformer stations, the surplus lines were removed and used to complete the three-phase lines where three wires were not available under the old distribution system.



The Purchased Energy Is Delivered to the Junction Switching Station, Which Is Arranged so that the Two Main Divisions of the System May Be Sectionalized at This Point

Practically all new electrical apparatus for the entire re-equipment of the property, including transformers, lightning arresters, oil switches, substation equipment and motors and control for both passenger and freight cars, was furnished by the Westinghouse Electric & Manufacturing Company.

Since the power is now put on the railway company's high-tension lines at the new junction switching station instead of as before at the Rushville power house, it was necessary to build two additional sections of line. These sections extend from the junction to Hoffman on the Rushville division, and from the junction to Wildwood on the Greensburg division.

All points on the triangle bounded by the junction, Shelbyville and Rushville, are on a loop which can be fed in two directions, thus insuring against a shutdown of service in the event of failure of one section of the line. Martin, Prescott and Adams stations are on protruding legs of this triangle. Since failure of the high-tension lines to these stations would interrupt the service on these sections only, it was felt that the importance of providing against such a contingency did not warrant the expense of building duplicate lines to these points at this time.

LINES CAN BE SECTIONALIZED

Provision has been made for sectionalizing the transmission system in the event of trouble on the lines. By utilizing practically all of the original oil switching equipment and by the installation of three sets of new oil switches, sectionalizing on the important divisions can be accomplished with ease. In addition, air-break disconnects at some of the substations not provided with oil switches are arranged so that the high-tension lines can be opened at several points. At such sectionalizing points the station can be cut off the line, or in the event of trouble in one section, that side of the line can be opened. Under such conditions the station can be continued in operation from the other side of the line. This arrangement is more clearly illustrated in the diagram on page 114.

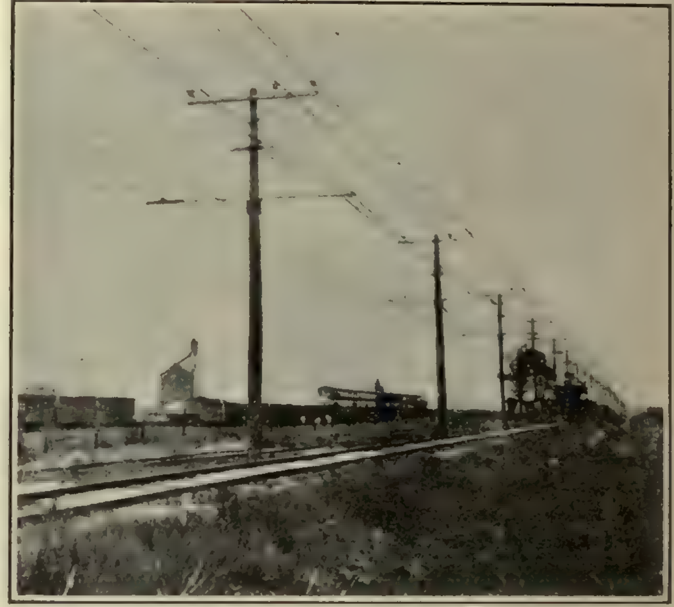
Leaving the junction, the high-tension line on the Rushville division first reaches the new substation at Hoffman. Here it passes through a typical outdoor switching station which, though not provided with oil switches, is nevertheless arranged so that the line can be disconnected in either direction, and the station operated from the one connected end. The switching arrangement is illustrated in the small diagram at the right on page 114, and the appearance of the outdoor apparatus is shown in the illustration on page 115.

The main tower structure is composed of Bates expanded steel poles. Diamond-shaped channel frames are bolted across between the center pole and each of the four corner poles, so as to form supports for the four sets of disconnect switches. The high-tension lines come into the station on two horizontal supports carried at right angles on extensions of the center and two of the corner posts. The lines are then carried to the disconnect switches below. These are arranged so that the lines from each direction may be connected to each other and also to the station. In addition the station may be disconnected entirely, or the two sections of the high-tension lines may be separated, and the station connected to either section.

Westinghouse "Auto-valve" lightning arresters are supported on an angle framework. These are shown together with the outdoor choke coils and transformer in the illustration on page 115.

Reedville is the next station going east on the Rushville division from the junction. Here the arrangement is similar to that at Hoffman except that in addition to the apparatus described for Hoffman, Reedville is also equipped with a set of oil switches which may be used to open the high-tension line.

East from Reedville is Gwynneville, a "stub-end" station in the sense that the high-tension line passes through without any break, and the station is simply connected to it with no provision to open the line at this point. The outdoor switch gear consists of a single set of horn-gap switches. An accompanying diagram illustrates the arrangement of the high-tension wiring at this point. Martin station on the Rushville division and Fairland, Prescott and Adams stations on the Greensburg division all have arrangements similar to that at Gwynneville. Wildwood station on the Greensburg division is similar to that at Hoffman.



This Section of the Line Between the Junction and Hoffman Station Illustrates the Type of Three-Phase Overhead Construction Used. The Catenary Trolley Has Been Retained

SWITCHING EQUIPMENT IN POWER HOUSE UTILIZED FOR SECTIONALIZING THREE-PHASE LINES

At Rushville the substation is of the semi-automatic type, and is connected to the high-tension line as a "stub-end" station similar to Gwynneville. In the power house at Rushville, the generating equipment will be dismantled, but the oil-switch equipment is utilized with some slight changes to make this an important sectionalizing switching station. The original switch equipment at this point consisted of four sets of four-pole oil switches. These switches have been left in place and the operating shafts rearranged so that three poles of each of the oil switches will be utilized to sectionalize the three-phase lines. The new arrangement has the high-tension line coming in from Gwynneville connected to the station buses through three poles of one of the original four-pole oil switches. A second oil switch connects these buses to the cross-country line extending to Shelbyville. The remaining two sets of switches connect the buses to Martin substation and to the Rushville semi-automatic substation respectively.

When the original single-phase high-tension system was built, a switching station was put in at Shelbyville, where the cross-country lines from Rushville connected to the lines on the Greensburg division. This station is retained, and by rearranging the operating shafts on the original two-pole oil switches they have been converted into three-phase switches for use in sectionalizing the new lines. The cross-country line from Rushville comes into this switching station through one set of such converted oil switches, and connects to the station buses. In the same way, the high-tension lines on the Greensburg division, coming from the junction switching station, are connected to these station buses through a similar set of converted oil switches. A third set of switches connects the lines going east from Shelbyville to the same buses.

ONE OF THE SUBSTATIONS INSTALLED IS SEMI-AUTOMATIC

An interesting feature of the new power and distribution system is the use of full automatic control for all but one of the substations, that at Rushville. This is semi-automatic in order that it may operate continuously to maintain voltage in the feeder system. Such an arrangement is necessary because the automatic stations start up on under-voltage and shut down on underload. Unless voltage is maintained on the feeders by the continuous operation of at least one station, the full automatic stations would start up as soon as the voltage dropped, and then if this occurred when no load demand was present, the station would immediately shut down, only to repeat the performance by starting up again because of under-voltage.

Instead of installing the semi-automatic station to maintain the voltage of the feeder system, another alternative would have been to purchase such power from the city lines of Indianapolis. To make the system self-contained, however, one semi-automatic station was installed for this purpose. Although this station is thus required to operate during some periods of the night with no load, it is expected that the increase in freight business, which is handled during the night, will ultimately put some load on the system at practically all hours. This will be particularly true as it becomes necessary to increase the amount of freight switching operations during the night.

TRAFFIC GROWTH PROVIDED FOR

The entire new power distribution system is the result of a complete analysis of the requirements of the present service, with reasonable provision for future growth in traffic and for contingencies arising from interruptions in either the high-tension system, feeder system or substations. Another consideration which was kept in mind, both in selecting the rolling stock and in determining the design and type of apparatus to be used for the power supply and distribution system, was the requirement for the contemplated high-speed through operation when the line is extended to Cincinnati. The new equipment was selected so as to be suitable for use in connection with such service, but at the same time present expenditures were not made any greater than was considered necessary to handle the existing requirements together with reasonable provision for increased traffic or contingencies arising from apparatus failures.

At the present time, the basic service on the Rushville division consists of ten local trains, four limited trains and one freight train in each direction each day. On the Greensburg division there are eight local passenger trains eastbound and eight westbound, together with four limited passenger trains in each direction each day. Dispatch freight (station delivery express) is carried in the baggage-express room of every passenger car. In addition, there is on this division one freight train in each direction daily. The company also brings into Indianapolis two livestock trains daily, one on each division, operated, however, under special orders and not on the time-table.

Passenger train schedule speeds are comparatively high. In limited service the maximum speeds are approximately 60 m.p.h., and even in local service speeds of 50 m.p.h. are frequently obtained. In the event of future extension to Cincinnati, a 3-hour service between the terminals is contemplated.

In subsequent articles will be described the automatic substation equipment, arrangements for insuring continuity of service, and the new cars which are a part of the modernization program of the Indianapolis & Cincinnati.

How Atlanta Keeps Cars on Time

Running Time Cards Carried on the Cars Have Resulted in More Uniform Headways—Schedule Speed Has Been Increased in Spite of Congestion

NARROW streets, a business district concentrated within a small area, and unsatisfactory railway routing, make the job of keeping street cars on time in Atlanta, Ga., a difficult one. The Georgia Railway & Power Company has been working on this problem for some time, and in spite of these handicaps has succeeded in increasing slightly the schedule speed and maintaining uniform headways.

The business district of the city covers a relatively small area. In this section the streets are narrow, and the buildings rise to considerable heights. Traffic congestion has been the inevitable result of these conditions. A steam railroad cut divides this district into two sections, and one of the chief difficulties encountered by the railway is occasioned by lack of means to cross this cut. Only three bridges connect the north and south sides of the city. Cars approaching the center of the town from the south must cross the cut in order properly to serve that portion of the business district which lies to the north, and vice versa. A great number of cars, therefore, must cross the three bridges which are the neck of the bottle.

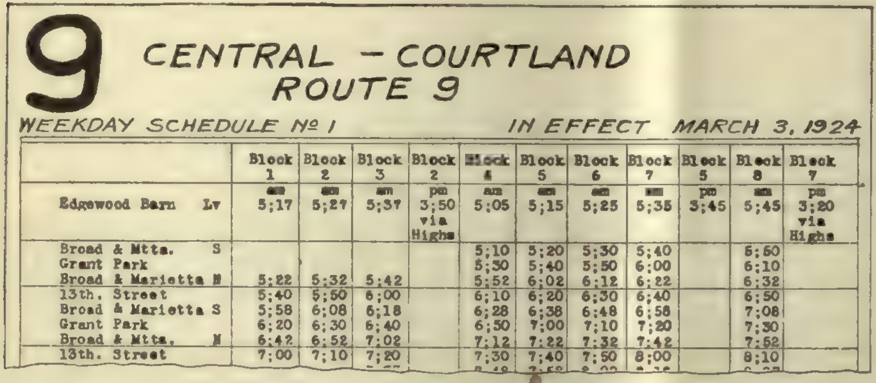
ATLANTA TRACK MILEAGE EXTENSIVE

Atlanta is said to have more miles of track per thousand of population than any other place in the country except Salt Lake City. The railway operates 24 city lines and two interurban lines. Of the city lines 15 are through routes and nine turn back in the center of town. Both of the interurban routes loop back. Excess of track and unsuitability of some routes to present-day needs complicate the problem.

In the morning there are two traffic peaks. The first is occasioned by the negroes who go to work about 7 o'clock, and the second by the opening of the business houses at 8 o'clock and the offices at 8:30 o'clock. This peak is augmented by the fact that the high schools, which open at 8:30 a.m. are located in the downtown district. In the afternoon conditions are worse because all factories, shops and offices, in fact everything except the high schools, close at 5 p.m.

Careful attention has been devoted by the railway to overcoming these difficulties and providing good service. Headways are checked and schedules prepared under the direction of H. C. Fligg, transportation engineer, and W. M. Casey, superintendent of transportation. Four checkers are employed to make passenger counts at the maximum load points of the various lines. All-day checks are made from 5:30 in the morning until midnight, and rush-hour checks from 6 to 9 in the morning and from 2 until 7 in the afternoon.

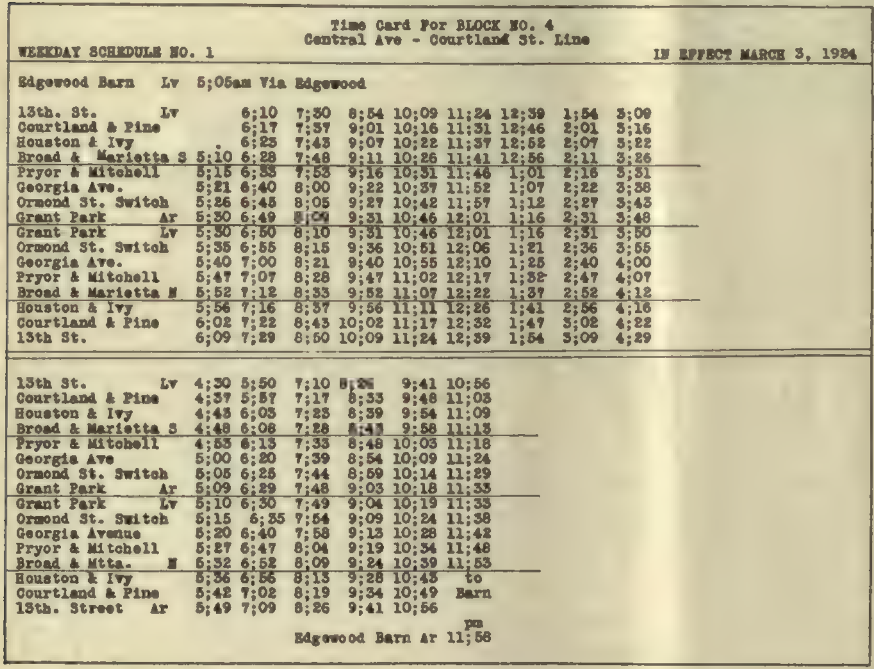
The form of time-table used by the Georgia Railway & Power Company differs from the standard A.E.R.A. time-table, in that the run numbers are arranged across the page, and the time points are in a vertical column. The time is shown for both ends of the line and also in each direction at the center of the city. An interesting feature is that the time-tables instead of being blue-printed are typewritten, and reproduced on a duplicator machine.



9 CENTRAL - COURTLAND ROUTE 9

WEEKDAY SCHEDULE Nº 1 IN EFFECT MARCH 3, 1924

	Block 1	Block 2	Block 3	Block 2	Block 4	Block 5	Block 6	Block 7	Block 5	Block 8	Block 7
	am	am	am	pm	am	am	am	am	pm	am	pm
Edgewood Barn Lv	5;17	5;27	5;37	3;50 via Highs	5;05	5;15	5;25	5;35	3;45	5;45	3;20 via Highs
Broad & Mtta. S					5;10	5;20	5;30	5;40		5;50	
Grant Park					5;30	5;40	5;50	6;00		6;10	
Broad & Marietta N	5;22	5;32	5;42		5;52	6;02	6;12	6;22		6;32	
13th. Street	5;40	5;50	6;00		6;10	6;20	6;30	6;40		6;50	
Broad & Marietta S	5;58	6;08	6;18		6;28	6;38	6;48	6;58		7;08	
Grant Park	6;20	6;30	6;40		6;50	7;00	7;10	7;20		7;30	
Broad & Mtta. N	6;42	6;52	7;02		7;12	7;22	7;32	7;42		7;52	
13th. Street	7;00	7;10	7;20		7;30	7;40	7;50	8;00		8;10	



Time Card For BLOCK NO. 4
Central Ave - Courtland St. Line

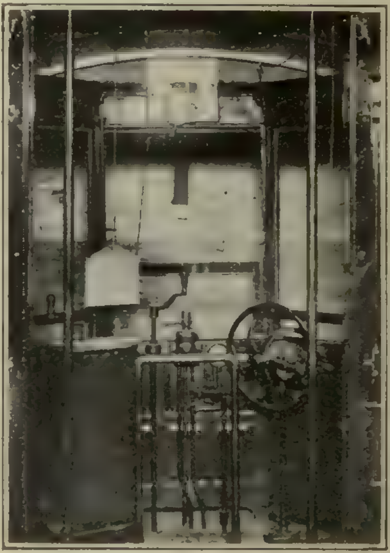
WEEKDAY SCHEDULE NO. 1 IN EFFECT MARCH 3, 1924

Edgewood Barn Lv 5;05am Via Edgewood

13th. St. Lv		6;10	7;30	8;54	10;09	11;24	12;39	1;54	3;09
Courtland & Pine		6;17	7;37	9;01	10;16	11;31	12;46	2;01	3;16
Houston & Ivy		6;23	7;43	9;07	10;22	11;37	12;52	2;07	3;22
Broad & Marietta S	5;10	6;28	7;48	9;11	10;26	11;41	12;56	2;11	3;26
Pryor & Mitchell	5;15	6;33	7;53	9;16	10;31	11;46	1;01	2;16	3;31
Georgia Ave.	5;21	6;40	8;00	9;22	10;37	11;52	1;07	2;22	3;38
Ormond St. Switch	5;26	6;45	8;05	9;27	10;42	11;57	1;12	2;27	3;43
Grant Park Ar	5;30	6;49	8;09	9;31	10;46	12;01	1;16	2;31	3;48
Grant Park Lv	5;30	6;50	8;10	9;31	10;46	12;01	1;16	2;31	3;50
Ormond St. Switch	5;35	6;55	8;15	9;36	10;51	12;06	1;21	2;36	3;55
Georgia Ave.	5;40	7;00	8;21	9;40	10;55	12;10	1;25	2;40	4;00
Pryor & Mitchell	5;47	7;07	8;28	9;47	11;02	12;17	1;32	2;47	4;07
Broad & Marietta N	5;52	7;12	8;33	9;52	11;07	12;22	1;37	2;52	4;12
Houston & Ivy	5;56	7;16	8;37	9;56	11;11	12;26	1;41	2;56	4;16
Courtland & Pine	6;02	7;22	8;43	10;02	11;17	12;32	1;47	3;02	4;22
13th St.	6;09	7;29	8;50	10;09	11;24	12;39	1;54	3;09	4;29

13th St. Lv	4;30	5;50	7;10	8;26	9;41	10;56
Courtland & Pine	4;37	5;57	7;17	8;33	9;48	11;03
Houston & Ivy	4;43	6;03	7;23	8;39	9;54	11;09
Broad & Marietta S	4;48	6;08	7;28	8;43	9;58	11;13
Pryor & Mitchell	4;53	6;13	7;33	8;48	10;03	11;18
Georgia Ave	5;00	6;20	7;39	8;54	10;09	11;24
Ormond St. Switch	5;05	6;25	7;44	8;59	10;14	11;29
Grant Park Ar	5;09	6;29	7;48	9;03	10;18	11;33
Grant Park Lv	5;10	6;30	7;49	9;04	10;19	11;33
Ormond St. Switch	5;15	6;35	7;54	9;09	10;24	11;38
Georgia Avenue	5;20	6;40	7;58	9;13	10;28	11;42
Pryor & Mitchell	5;27	6;47	8;04	9;19	10;34	11;48
Broad & Mtta. N	5;32	6;52	8;09	9;24	10;39	11;53
Houston & Ivy	5;36	6;56	8;13	9;28	10;43	to
Courtland & Pine	5;42	7;02	8;19	9;34	10;49	Barn
13th. Street Ar	5;49	7;09	8;26	9;41	10;56	

Edgewood Barn Ar 11;58 pm



The first illustration shows the form of time-table used by the Georgia Railway & Power Company.

The second illustration shows the time card which informs the motorman when he should arrive at various points along the line.

The view above shows how running time cards are carried in racks on the cars.

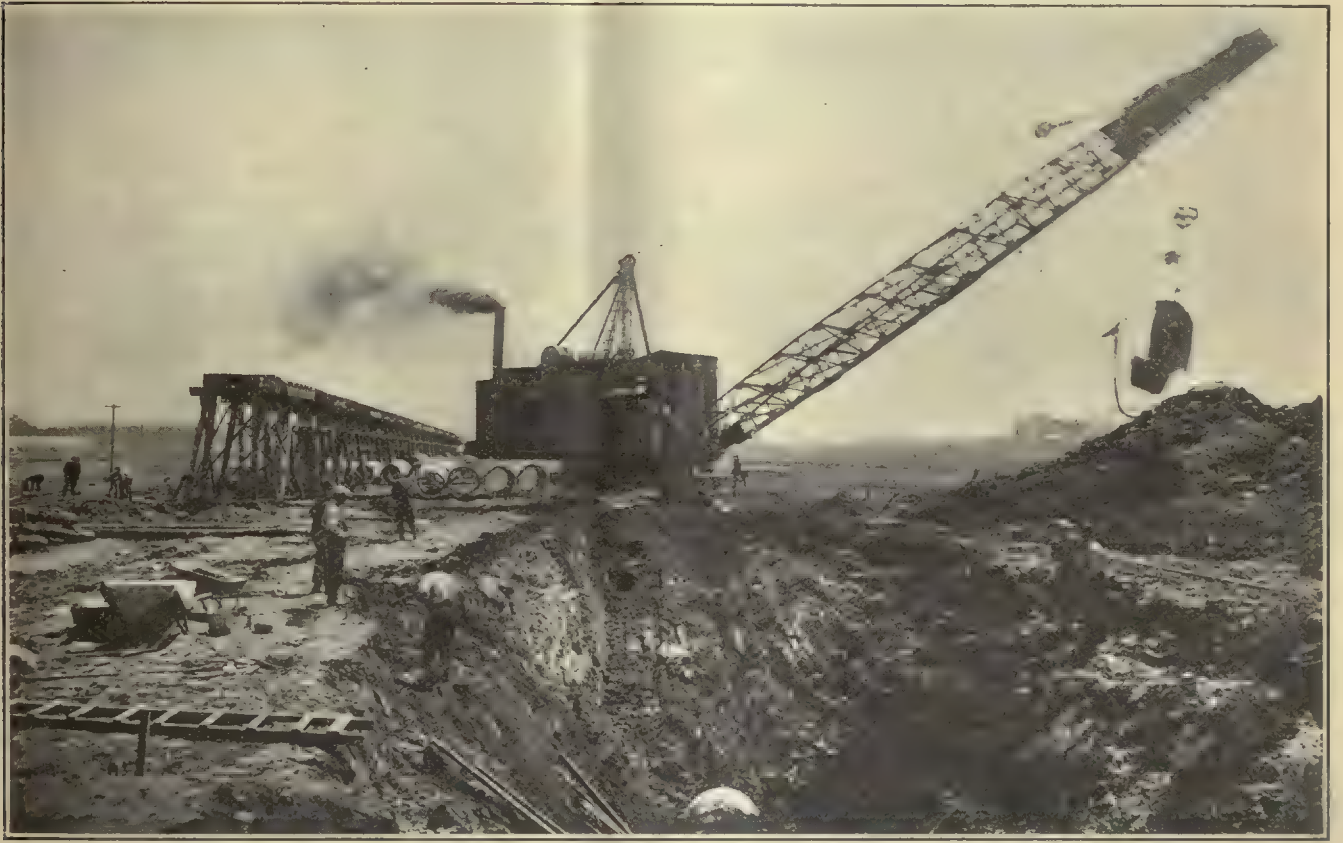
After the time-table has been prepared the schedule is divided into crew assignments, and running time cards are made out for each motorman. It is required by agreement with the men that time-tables be arranged with at least 50 per cent of 9-hour straight runs, 40 per cent of two-piece swing runs with not more than 15 hours spread, and less than 10 per cent of three-piece runs. The minimum pay allowance is for 8 hours time. On Sundays and holidays all runs are straight, but the minimum pay feature is not considered.

An average speed of 9.24 m.p.h. is maintained within the so-called "7 mile" limits of the city. All lay-overs, etc., are included in this figure, the speed being calculated from the time the car leaves the carhouse in the morning until it returns at night. In the congested districts of the city, however, the schedule speed is only 5.87 m.p.h. This is partly the result of the congestion already referred to, but other reasons are the lack of adequate parking restrictions and the excessively close spacing of stops. Longitudinal parking is permitted on the narrow streets, and diagonal parking on the wide streets. As a result, almost all moving vehicles travel along the car tracks. Cars are required to stop at every street in the section, and at many other points. Some stops are less than 300 ft. apart and few are more than 500 ft. apart. Renewed and effective enforcement of the regulation for street traffic and the elimination of unnecessary car stops to effect quicker service have been asked for by the railway in a petition to the Mayor and General Council.

To aid the motorman in maintaining the schedule, a time card such as shown in an accompanying illustration is furnished to him. This is placed in a galvanized iron rack located on the front platform where he can consult it easily at any time. Each trip is divided into short sections and the schedule time at various points about 5 minutes apart is shown. The use of these time cards has resulted in having much more uniform headways. Since the adoption of the scheme the general public has made favorable comment concerning the improvement.

Building the Waukegan Cutoff on the North Shore Line

Initial 5-Mile Section to Be Operated by Chicago Rapid Transit Company—Grade Separation at Streets and Railroad Crossings Insures Fast Schedule—Use of Automatic Pumps Solves Difficult Drainage Problem — Announcement of Extension Creates Spectacular Real Estate Boom



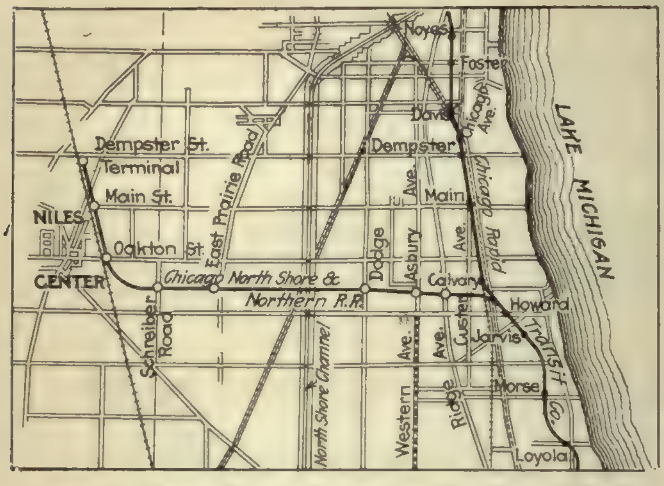
Adequate Drainage Is Provided by a 36-In. x 40-In. Oval Reinforced Concrete Outfall Sewer to the Drainage District Channel. Trestle Work Under Construction Is Shown Looking East from Ridge Avenue

AN INITIAL 5-mile section of a new right-of-way between Chicago and Waukegan has been acquired by the Chicago, North Shore & Milwaukee Railroad and construction work is under way. This is part of a high-speed cutoff which will ultimately give the North Shore Line a private right-of-way from Howard Street to Waukegan. Swinging slightly north of west for approximately 4 miles from the present line at Howard Street in Evanston, the new route then continues north to Dempster Street, Niles Center, where for the present it will have its terminus.

A subsidiary company called the Chicago, North Shore & Northern Railroad has been organized to acquire and build the new extension. Trackage rights will be leased to the Chicago Rapid Transit Company, and for the time being only the elevated trains of that company will be operated between Niles Center and the Howard Street junction. The future extension, from Niles Center to Waukegan, will be made on joint right-of-way owned by the Public Service Company of Northern Illinois and by the Chicago, North Shore & Northern Railroad. All of the right-of-way of this proposed line will be of sufficient width to permit of a four-track railroad and two high-tension transmission lines. The extension from Niles Center to Waukegan will probably not be made for several years. When that work is completed, however, it will enable a material saving in time to be made by the high-speed North Shore limited trains, which are now required to run at slow speed through some of the communities along the present right-of-way.

The significance of the position which will be occupied by the North Shore Line when the new route is completed to Waukegan may be appreciated by a study of the adjoining territory. Extending north from Chicago at the present time are two strips of communities, one on the east, following the line of the Northwestern Railroad and the present North Shore Line, and another on the west, lying along the route of the Chicago, Milwaukee & St. Paul. Between these two belts is a wide and fertile section of territory running north from Chicago in the Skokie Valley. The route of the new North Shore cutoff will extend through the center of this belt and will probably be the means of developing an entirely new string of communities.

Physical conditions have influenced the type of



Route of the New 5-Mile Extension from the Howard Street Junction to the Terminal at Dempster Street

construction adopted for the initial section of the new line. Grade separation was dictated by present and future traffic conditions. Howard Street is the boundary line between Evanston and Chicago and there is a very heavy vehicular traffic, both passenger and truck, between the two cities. Sheridan Road, on the east, and Ridge Avenue, on the west, furnish the two main arteries for passenger traffic. At the present time Chicago Avenue, which crosses the new extension a short distance west of the junction point with the present North Shore Line, is the principal north and south traffic street for heavy trucking into Chicago. In addition, this street has a double-track street car line. As the volume of such traffic, both from Evanston and other North Shore communities, is constantly on the increase, other through traffic streets will probably be required in the near future. Such streets are offered first by Custer Street and then further west by Asbury Street, which is a continuation of Western Avenue in Chicago. As these streets afford the only future arteries for the relief of Chicago Avenue, it was necessary to provide for grade separation at these crossings.

After leaving the present elevated North Shore right-of-way at Howard Street, Chicago Avenue and the elevated Milwaukee Division of the Chicago & Northwestern Railway are encountered almost immediately. The contemplated new through traffic streets are crossed further west.

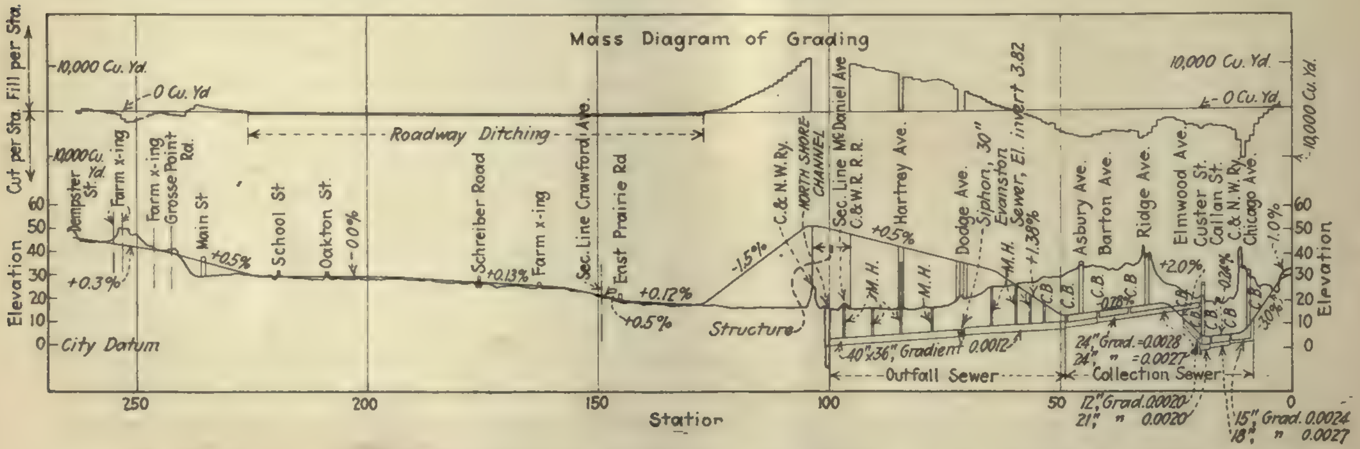
In order to avoid prohibitive grades at the Northwestern Railroad crossing, there was no choice but to go under the existing line. This made it necessary also to go under Chicago Avenue, and in turn complicated the problem of grade separation at the through streets further west, due to the fact that the elevation of the land between the Northwestern right-of-way and Ridge Avenue, approximately ½ mile west, is only about 18 ft. above the level of Lake Michigan and some of the intervening streets were laid out for this level.

Recognizing the physical difficulties involved in providing for grade separation at Custer Street, the authorities of Evanston agreed to raise the level of this street 6 ft. above the established grade, and also agreed to close some of the intermediate, less important north and south streets. The grades of Ridge Avenue and Asbury Street are 38 and 35 ft. above lake level respectively, which allows the new line to pass under them without any particular difficulty.

INDEPENDENT DRAINAGE SYSTEM REQUIRED FOR A PORTION OF THE ROUTE

Even with Custer Street raised 6 ft. to the grade of 25½ ft. above lake level, it will be necessary, in order to obtain legal clearances, to put the sub-grade of the line at about 2½ ft. above lake level. This condition introduces a difficult drainage problem, as the sub-grade will be below the sewer levels throughout Evanston. Furthermore, the city sewers do not have sufficient capacity to take the large amount of drainage water which must be handled, and it was therefore necessary to provide an independent outlet.

The only other outlet available is the north shore channel of the Sanitary District, located about 1½ miles west of the cut under Custer Street and about 1 mile west of the depression below Asbury Street. From Asbury Street west the natural surface drainage is toward the channel. There is also a difference in elevation between the bottom of the contemplated cut at Asbury Street and the channel, sufficient to allow a 36-in. x 40-in. oval, reinforced concrete outfall sewer, 1 mile long, to be built with a fall of 6 ft. in 5,000 ft. By providing a hump in the cut between Ridge Avenue and Custer Street the drainage into the cut west of Ridge Avenue will be separated from the portion east of Ridge Avenue. This will localize the drainage into the low area centering at Custer Street and hold the amount of water to a minimum. The drainage on that portion of the cut west of the hump at Ridge Avenue will flow by gravity in ditches and will be collected by catch basins in auxiliary sewers emptying into the outfall sewer.



Condensed Profile of the New Extension Shows Method of Crossing Through Streets and Also Illustrates the Scheme Adopted to Handle the Difficult Drainage Problem

A smaller sewer will continue east from the east end of the outfall sewer at Asbury Street, rising at the rate of 6 ft. in 5,000, and before reaching an elevation corresponding with the grade of the bottom of the cut it will be carried outside of the cut, continuing east as far as Custer Street. At this point the sewer is considerably above the level of the bottom of the cut.

This location is also the center of the low area east of Ridge Avenue, where the natural land drainage will be into the railway cut. Here, therefore, the drainage water will be elevated by automatic pumps of capacity sufficient to care for the maximum possible rainfall and will be discharged into the sewer just described, which starts west from this point. This will lead directly to the outfall sewer and discharge into it at Asbury Street. The pumps are to be arranged in tandem so as to give duplicate protection in the event one of them fails.

LONG BRIDGE CONSTRUCTION

Near the drainage channel is the Mayfair cutoff of the Chicago & Northwestern Railroad, which is elevated. The new right-of-way crosses this elevated road and in order to get legal clearance, the tracks at this point will be approximately 38 ft. above the natural ground surface. In the immediate vicinity of this crossing it is also necessary to provide spans over two future streets not yet opened through and over the new McCormick highway under construction by the Sanitary District. In addition, the drainage channel must be crossed, as well as the Chicago West Ridge Railroad. To provide for these various crossings will require a total length of structure made up of various types of bridge construction of approximately 1,000 ft. without any intervening embankment or surface construction.

On sections of the line where fills will be made the right-of-way has a minimum width of 150 ft., which gives room for free slope embankments. All bridges and viaducts are being designed for a four-track railroad, but only two tracks will be built at first. A.R.E.A. specifications for bridges and viaducts will be used throughout.

West from the Mayfair cutoff the track will descend to the surface and will continue west and north on the surface to the Dempster Street terminal. The maximum grade of the line, except for two short distances, will be 1½ per cent. The maximum curvature will be 3 deg. and all curves 2 deg. and over will be built with spiral easements. The length of the new line from Howard Junction to the terminal in Niles Center at Dempster Street will be exactly 5 miles. Approximately 350,000 cu.yd. of grading work will be done, 1,700 tons of structural steel will be required and about 20,000 cu.yd. of concrete will be placed. Construction work is now under way and is being pushed as fast as materials become available. It is expected that the work will be completed and the line put in operation within a year. L. E. Myers & Company of Chicago have the general construction contract and are handling most of the work themselves.

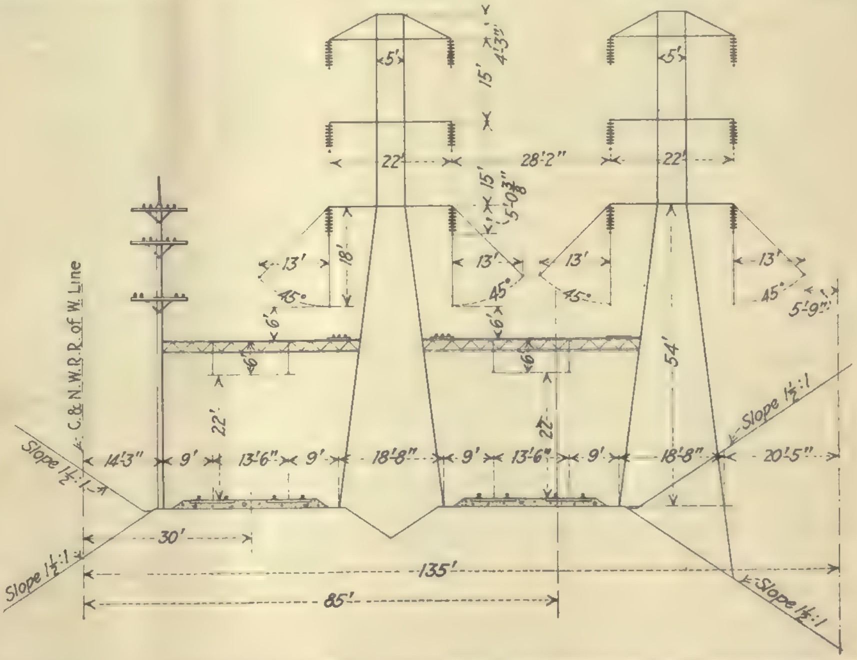
Present Appearance of the Right-of-Way Looking West from Asbury Street. Rapid Transit Service Is Expected to Produce a General Building Development

The Chicago Rapid Transit Company has acquired a 40-acre tract of land on the new line just west of the Mayfair cutoff near the point where the line descends to grade. This is to be used for a future shop and terminal yard.

Stations will be located initially at Ridge Avenue, Asbury Street and Dodge Avenue in Evanston and between Crawford Avenue and Prairie Road and at Schreiber Road, Oakton Street, Main Street and Dempster Street in the village of Niles Center. The first 2 miles of the new line will be in the city of Evanston and the last 3 miles in Niles Center. The stations at Ridge Avenue and Asbury Street will have the buildings at the street level and the platforms in the cut at the track level. The Dodge Avenue station will have the building at the street level and the platform will be elevated to correspond with the track. The rest of the stations are to be at points where the track is on the surface.

SPECTACULAR INCREASE IN LAND PRICES

A striking example of the effect of transportation on property values is furnished by the results following



The High-Tension Line Right-of-Way of the Public Service Company of Northern Illinois Is Wide Enough to Accommodate a Four-Track Railroad and Maintain Legal Clearances. The Line North from Dempster Street Will Ultimately Be Extended to Waukegan on This Right-of-Way

the announcement of the new line. Although the property for the railway right-of-way had been acquired very carefully and at favorable prices, public announcement of the new extension was immediately followed by a spectacular real estate boom in all the adjacent territory. Property prices rose overnight to figures in some cases eight or ten times the previous values. Land near the new Dempster Street terminal jumped to figures even higher than these. In other sections of the wide territory affected prices rose from three to five times the values quoted before the new line was announced.

Cost of Carrying Weight on Cars

A Study Made on Boston Elevated Railway Shows that $219 per Ton per Year Is Spent Under Conditions Obtaining in That City

AN INTERESTING study of the cost of carrying weight on cars has lately been prepared by John Lindall, superintendent rolling stock and shops, Boston Elevated Railway, for discussion within that organization. Through his courtesy the following tabulation of estimated costs is presented, the method of reaching these results being somewhat out of the ordinary. The total cost, as determined from the study, is $219 per ton per year, or about 11 cents per pound.

In Table I is given the computation of the above unit cost, based on the company's operations in the year 1923. Starting with the number of passengers carried, and applying the estimated average haul of 4.5 miles per passenger, as derived from numerous traffic studies, the figures for total passengers for the year is determined. Allowing an average weight per passenger of 140 lb. the total passenger-pound-miles reaches 240.75 billions, giving a total passenger ton-mileage of 120,377,145. The total car ton-miles in passenger service is known from company records, and the sum of this and the passenger ton-miles gives a total of nearly 1,500,000,000 ton-miles. An interesting side light is the ratio of passenger ton-miles to total ton-miles, which is 9 per cent.

TABLE I—COST OF CARRYING WEIGHT ON CARS, BOSTON ELEVATED RAILWAY, YEAR 1923

Number of passengers carried	382,149,667
Multiply by average miles per passenger ride	4.5
Total passenger-miles	1,719,673,501
Multiply by average weight per passenger	140
Passenger pound-miles	240,754,290,140
Total passenger ton-miles	120,377,145
Total car ton-miles	1,331,121,632
Total car and passenger ton-miles	1,451,498,777
Ratio of passenger ton-miles to total ton-miles	0.09
OPERATING EXPENSE ACCOUNTS, 1923	
Way and structures	$4,030,197
Equipment	3,507,213
Power	3,094,731
Total	$10,632,141
Divide by total ton-miles	1,451,498,777
Cost of carrying weight in mills per ton mile	7.3
Multiply by miles per car per year	30,000
Cost of carrying weight per ton per year	$219
GENERAL BALANCE SHEET: INVESTMENTS	
Roadway and structures	$60,895,144
Equipment	23,915,042
Power	16,545,809
Total	$101,355,995

The major items in operating expenses related to the weight of car traffic include maintenance of way and structures, maintenance of equipment, and cost of power. The total of these for last year was $10,632,141, and dividing this by the total ton-miles gave 7.3 mills per ton-mile as the cost of haulage. On the known basis of 30,000 miles run per car-year, the cost of $219 per ton per year was reached.

TABLE II—CAR WEIGHTS, SHOWING POUNDS PER PASSENGER BASED ON MAXIMUM PASSENGER LOAD, SURFACE LINES

Type of Car	Number of Seated Passengers	Total Number of Passengers	Light Weight, Tons	Car Weight per Passenger, Lb.	Cost per Car-Mile,* Cents	Hp. per Ton (Light)
16-ft. box	22	68	8.4	247.05	6.1	....
20-ft. box	26	82	9.7	236.5	7.1	5.62
25-ft. box	34	88	12.5	284.09	9.1	8.0
26-ft. 6 in. box	34	96	15.5	322.9	11.3	5.16
No. 1 semi-convertible	48	140	23.5	335.7	17.1	5.53
No. 2 semi-convertible	52	150	26.7	356.0	19.5	4.86
No. 3 semi-convertible	52	150	28.5	380.0	20.8	7.01
Nos. 4, 4-A, 4-A-2 and 4-A-3 semi-convertible	52	159	26.6	334.5	19.4	9.02
34 ft. 4 in.	52	159	24.4	306.9	17.8	5.32
Nos. 1, 1-A, 1-B, 1-C, 1-D, 1-E trailer	62	159	13.1	164.7	9.5	...
Birney safety	32	66	8.3	251.5	6.1	6.02
Nos. 1, 1-A, 1-B, 1-C, 1-D center entrance motor	56	157	22.2	282.8	16.2	7.20
Nos. 5, 5-A, 5-A-1, 5-A-2 semi-convertible	48	151	15.7	207.8	11.4	6.35
No. 4 semi-convertible and trailer (train)	114	318	39.6	249.0	28.9	6.06

* Way, equipment and power.

From the general balance sheet of the company it will be seen that the investment in roadway and structures, equipment and power supplying facilities totaled more than $100,000,000. A portion of the fixed charges on this investment is properly to be apportioned to the cost of carrying weight on the cars of the company, and not all the operating expenses above listed can be billed directly against the pounds carried. There appeared to be more or less of an offset between these rather indeterminate items. For this reason the total operating cost was prorated against the ton-miles and the resulting figure taken for the purposes of the study. This was applied to the design of rolling stock for train service in the East Boston tunnel and was used in other ways.

Table II shows the relations between weight and passenger carrying capacity, including standing passengers, for the various types of passenger cars used by the company on its surface lines, and Table III gives similar data for the rapid transit lines. The average cost of weight haulage, figured as 7.3 mills per ton-mile, has been applied to these car types. The results are shown in the next to the last column in each table, which represents the estimated cost of dead-weight haulage per car-mile in terms of the combined way, equipment and power expenses.

TABLE III—CAR WEIGHTS, SHOWING POUNDS PER PASSENGER, BASED ON MAXIMUM PASSENGER LOAD, RAPID TRANSIT LINES

Type of Car	Number of Seated Passengers	Total Number of Passengers	Light Weight, Tons	Car Weight per Passenger, Lb.	Cost per Car-Mile,* Cents	Hp. per Ton (Light)
Nos. 1 and 2 elevated	48	162	29.6	365.4	21.6	11.82
Nos. 3, 4, 5 and 6 elevated	48	162	34.9	430.8	25.5	6.87 10 02
Nos. 7 and 8 elevated	44	167	33.9	405.9	24.7	7.28
Nos. 1, 2 and 3 Cambridge subway	72	287	43 2	301.0	31 5	10.41 10.87 9.25
No. 1 East Boston Rapid Transit Tunnel	44	180	22.0	244.4	16.1	7.27

* Way, equipment and power.

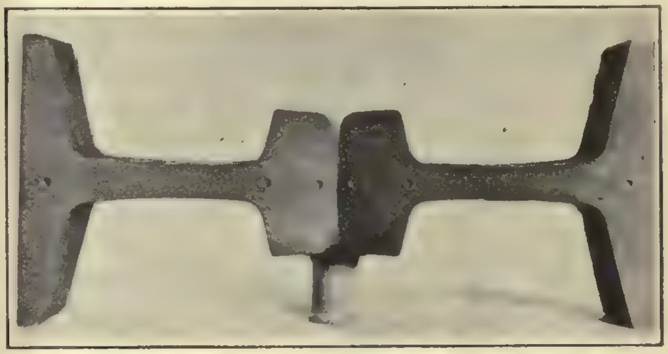
Mill Treatment Doubles the Life of Rail

Service Tests Made by the Boston Elevated Railway Show Wear on Sandberg Sorbitic Rail to Be Only About One-Half that on Untreated Rail in the Same Track—Cost of Treated Rail Is Slightly Higher

A CAREFUL and thorough investigation has been made by the Boston Elevated Railway to compare the wear on high carbon rails, mill treated by the Sandberg sorbitic process, with the wear on ordinary open hearth ferro-titanium rails. Conclusions reached from measurements taken on 25 rails after they had been in service over two years under heavy traffic indicated that the Sandberg rail was from 100 per cent to 300 per cent better than untreated rail. In individual cases the figures varied considerably from the average, but in every case the wear on the Sandberg rail was markedly less than on untreated rail.

Open hearth ferro-titanium rail and the same rail treated by the Sandberg process were laid for purposes of investigation on four curves of different radii on the elevated structure. These locations were: Haverhill and Causeway Streets, southbound track with 90-ft. center radius; Haverhill and Causeway Streets, northbound track with 90-ft. center radius; Henley Street, southbound track with 420-ft. center radius; Rollins Street, southbound track with 1,000-ft. center radius. After the test specimens had been in service for some time the amount worn off the heads of the rails was measured from time to time and the wearing qualities expressed in square inches reduction in cross-sectional area per million tons of service were averaged for each kind of rail. For purposes of comparison various rails laid on other curves were measured in a similar way. The general results of these tests are shown in Table I.

Although the cast manganese rail stands at the head of the list as regards wearing qualities, its cost is practically prohibitive, being nearly seven times that of the Sandberg rail. At the time this investigation was made the Sandberg sorbitic rail cost 73.36 cents per linear foot. Cast manganese rails cost approximately $5 per linear foot and possessed wearing qualities only 38 per cent better. The best of the open hearth specimens showed a wearing quality approximately 45 per cent as good as that of the sorbitic rail at a cost 85 per cent as great, or 61.97 cents per linear foot. Rolled manganese rails cost $2.087 per linear foot, but showed greater evidence of wear than the Sandberg rail. From these figures the Boston Elevated Railway concluded that the Sandberg sorbitic rail was the best rail procurable for use in curved track.



On the Right a Section of Sandberg Sorbitic Rail and on the Left a Section of Ordinary Open Hearth Ferro-Titanium Rail. The Locations of Brinell Tests Are Shown

TABLE I—GENERAL RESULTS OF RAIL TESTS

Kind of Rail	Date of Rolling	Wear per Million Tons Service, Square Inch
Cast manganese	....	0.0085
Sandberg sorbitic	....	.0118
Rolled manganese	....	.0127
Open hearth	July, 1908	.0263
Open hearth ferro-titanium	January, 1915	.0296
Open hearth ferro-titanium	August, 1912	.0331
Bessemer	March, 1903	.0337
Open hearth ferro-titanium	August, 1911	.0344
Open hearth ferro-titanium	November, 1911	.0382
Bessemer	November, 1902	.0393
Open hearth	January, 1911	.0442
Open hearth ferro-titanium	January, 1911	.0516
Open hearth ferro-titanium	....	.0606
Open hearth ferro-titanium	June, 1913	.0643
Bessemer	March, 1907	.0742
Bessemer nickel	March, 1900	.0960
Bessemer	July, 1906	.0973
Open hearth	October, 1915	.1028
Bessemer	December, 1905	.1044
Bessemer	February, 1905	.1323

DETAILS OF TESTS

Taking measurements of wear on Sandberg rails has been continued since the compilation of the figures shown in Table I and these later tests have confirmed the original conclusions. At Haverhill and Causeway Streets the outer rail of a 90-ft. radius curve in the southbound track was laid on Aug. 31, 1921, with seven Sandberg rails replacing 85-lb. A.S.C.E. section T-rail made by the open hearth ferro-titanium process, laid Oct. 31, 1916. The conclusions reached after the Sandberg rail had been in service about two and a half years was that it was about 115 per cent better than the untreated rail. Details of the tests made at this location are shown in Table II.

In this test measurements were taken 3 ft. from each end of each rail until Feb. 12, 1924, when additional measurements were taken on each rail to determine the greatest wear. This was found to be on the fifth of seven rails, counted in the direction of traffic. Comparison of service rendered by the Sandberg rail compared with previous service from untreated rail showed

TABLE II—AMOUNT WORN OFF HEAD OF OUTER RAIL OF 90-FT. RADIUS CURVE, SOUTHBOUND TRACK MEASURED VERTICALLY IN FEET

	4/1/22		12/2/22		6/1/23		9/1/23		11/10 23		2/12/24	
Rail	North End	South End	North End	South End	North End	South End	North End	South End	North End	South End	North End	South End
No. 1	0.000	0.002	0.002	0.010	0.008	0.016	0.008	0 017	0 008	0.018	0 010	0 021
No. 2	.002	.002	.011	.011	.015	.016	.016	.018	.017	.022	019	023
No. 3	.005	.005	.011	.015	.016	.022	.022	.022	.022	.024	.023	026
No. 4	.004	.004	.015	.014	.022	.022	.024	.025	.027	.027	.029	031
No. 5	.004	.006	.014	.014	.023	.025	.024	.025	028	.028	.031	031
No. 6	.005	.006	.014	.011	.024	.015	.027	.016	.028	.018	.031	019
No. 7	.003	.001	.009	.014	.014	.002	.016	.002	020	.003	021	003

TABLE III—AMOUNT WORN OFF HEAD OF RAIL OF 90-FT. RADIUS CURVE, NORTHBOUND TRACK, MEASURED VERTICALLY IN FEET

Rail	Heat	6/25/21	9/24/21 North End	9/24/21 South End	12/31/21 North End	12/31/21 South End	2/15/22 North End	2/15/22 South End	7/15/22 North End	7/15/22 South End	10/28/22 North End	10/28/22 South End	1/12/23 North End	1/12/23 South End
Untreated No. 1	13,617	0.010	0.013	0.016	0.021	0.028	0.022	0.032	0.008	0.013	0.016	0.030	0.023	0.038
Treated S.S.S. No. 2	13,617	.004	.007	.007	.012	.017	.015	.020	.024	.027	.029	.032	.031	.035
Treated S.S.S. No. 3	6,017	.004	.007	.007	.013	.011	.014	.013	.030	.021	.038	.025	.043	.028
Treated S.S.S. No. 4	13,617	.002	.006	.006	.009	.009	.011	.011	.020	.019	.023	.026	.026	.028
Untreated No. 5	12,818	.008	.017	.007	.014	.012	.025	.014	.012	.007	.029	.014	.036	.018

TABLE IV—AMOUNT WORN OFF HEAD OF RAIL OF 420-FT. RADIUS CURVE, MEASURED VERTICALLY IN FEET

Rail	11/26/21 South End	11/26/21 North End	7/15/22 South End	7/15/22 North End	1/6/23 South End	1/6/23 North End	7/14/23 South End	7/14/23 North End	9/1/23 South End	9/1/23 North End	10/23/23 South End	10/23/23 North End	3/20/24 South End	3/20/24 North End
Treated S.S.S. No. 1	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.003	0.001	0.003	0.001	0.003	0.001	0.004
Treated S.S.S. No. 2	.002	.002	.003	.003	.003	.004	.003	.006	.003	.003	.003	.004	.003	.007
Untreated No. 3	.005	.005	.007	.007	.010	.012	.011	.016	.011	.016	.011	.014	.012	.020
Untreated No. 4	.005	.005	.010	.010	.015	.015	.018	.018	.020	.020	.021	.021	.026	.029
Treated S.S.S. No. 5	.002	.001	.005	.005	.008	.008	.011	.011	.011	.011	.011	.001	.014	.014
Treated S.S.S. No. 6	.002	.003	.006	.006	.009	.007	.011	.010	.011	.011	.011	.011	.016	.013
Untreated No. 7	.006	.005	.014	.014	.021	.016	.025	.026	.027	.028	.029	.029	.035	.035
Untreated No. 8	.007	.007	.011	.012	.016	.023	.021	.027	.022	.029	.032	.030	.037	.036
Treated S.S.S. No. 9	.003	.003	.005	.007	.010	.011	.011	.015	.012	.017	.014	.017	.016	.020
Treated S.S.S. No. 10	.003	.003	.004	.005	.007	.011	.007	.014	.008	.006	.009	.017	.014	.023
Untreated No. 11	.004	.004	.017	.015	.031	.022	.035	.027	.036	.031	.041	.033	.045	.036
Untreated No. 12	.004	.003	.014	.013	.023	.024	.030	.031	.031	.033	.032	.036	.035	.040
Treated S.S.S. No. 13	.002	.001	.007	.004	.012	.004	.014	.007	.014	.007	.015	.007	.019	.007
Treated S.S.S. No. 14	.000	.000	.001	.000	.002	.002	.004	.004	.004	.004	.004	.004	.004	.005

0.0232 sq.in. reduction in cross-section of the treated rail per million tons of service and 0.0499 sq.in. worn off the head of the untreated rail per million tons of service. After the test had been completed the rail was removed from track and more recent measurements are not available.

A different procedure was followed on the northbound track at the same location. In this case the curve, which also has a 90-ft. radius, was laid March 9, 1921, with three Sandberg rails and one untreated rail at each end, making a total of five rails. Rails Nos. 1 and 5 were removed after about six months service and new open hearth ferro-titanium rails installed in their places. Details of this test are shown in Table III. The conclusion reached at the end of one year, ten months and three days was that the Sandberg sorbitic rail was 59 per cent better than untreated rail. The reduction in cross-sectional area per million tons of service was 0.0313 in the case of the treated rail and 0.0499 in the case of the untreated rail. The fact that the service given by these rails in the northbound track was notably less than similar rails in the southbound track may possibly have been due to the fact that in the former case the duration of the test was shorter than in the case of the rails laid in the southbound track.

Rails mill treated by the Sandberg process and tested at Henley Street on a 420-ft. radius curve on the southbound track were found to be 112 per cent better than untreated rails. In this case 14 rails were laid in the outside of the track on July 26, 1921, with alternate pairs of Sandberg rails and untreated rails. At the end of about 2 years and 8 months' service the treated rails showed a wear of 0.0109 sq.in. per million tons of service and the untreated rails a wear of 0.0232 sq.in. Details of the tests made at this location are shown in Table IV.

Extensive tests were made also on a 1,000-ft. center radius curve at Rollins Street. At this location the inner and outer rails were laid with alternate treated and untreated rails, 11 being used in each case. These were laid respectively on Oct. 14 and 11, 1920. At the end of more than 2 years' service these tests showed, for the inner rail, a wear of 0.0064 sq.in. per million tons of service on the Sandberg rail and 0.0195 sq.in. on the untreated rail. On the outside the Sandberg rail had suffered a reduction of 0.0050 sq.in. area per million tons of service and the untreated rail 0.0207 sq.in. This led to the conclusion that the treated rail was 204 per cent better than untreated rails on the inside and 314 per cent better on the outside rail. Complete figures for this test are shown in Table V.

COMPOSITION AND HARDNESS

Analyses were made of the chemical composition of the mill treated rails and also Brinell hardness tests. Sandberg rails used by the Boston Elevated Railway were made by the Bethlehem Steel Company. The

TABLE V—AMOUNT WORN OFF HEAD OF RAIL OF 1,000-FT. RADIUS CURVE, MEASURED VERTICALLY IN FEET

Rail	6/12/21	8/5/21	12/1/21 North End	12/1/21 South End	4/1/22 North End	4/1/22 South End	9/1/22 North End	9/1/22 South End	12/1/22 North End	12/1/22 South End	2/1/23 North End	2/1/23 South End	6/1/23 North End	6/1/23 South End
Inner rail laid Oct. 14, 1920.														
Untreated No. 1	0.008	0.010	0.008	0.013	0.010	0.017	0.012	0.019	0.012	0.019	0.012	0.019	0.012	0.019
S.S.S. No. 2	.006	.006	.006	.007	.008	.009	.010	.011	.010	.011	.010	.012	.011	.012
Untreated No. 3	.012	.014	.014	.018	.017	.020	.020	.023	.022	.025	.002	.026	.022	.030
S.S.S. No. 4	.003	.004	.008	.009	.009	.011	.012	.013	.012	.013	.012	.013	.012	.015
Untreated No. 5	.010	.012	.017	.017	.020	.019	.024	.024	.025	.025	.025	.027	.025	.029
S.S.S. No. 6	.004	.006	.008	.009	.011	.011	.013	.014	.013	.014	.014	.014	.015	.016
Untreated No. 7	.008	.010	.018	.015	.024	.018	.028	.022	.028	.022	.028	.022	.030	.026
S.S.S. No. 8	.004	.005	.007	.007	.010	.009	.012	.011	.012	.012	.012	.012	.013	.015
Untreated No. 9	.012	.017	.017	.024	.019	.028	.020	.032	.022	.036	*Rail renewed		1/8/23	
S.S.S. No. 10	.005	.005	.007	.006	.009	.007	.011	.009	.011	.011	.012	.012	.014	.012
Untreated No. 11	.006	.015	.020	.012	.023	.014	.023	.014	.024	.014	.024	.016	.024	.017
Outer rail laid Oct. 11, 1920.														
Untreated No. 1	.006	.012	.004	.013	.005	.016	.006	.019	.006	.020	.006	.021	.006	.025
S.S.S. No. 2	.004	.005	.007	.006	.009	.007	.010	.009	.010	.009	.010	.009	.012	.010
Untreated No. 3	.012	.016	.018	.022	.019	.026	.020	.030	.020	.030	.022	.030	.025	.030
S.S.S. No. 4	.006	.007	.008	.008	.011	.011	.012	.012	Rail changed account crack.					
Untreated No. 5	.010	.016	.016	.015	.018	.017	.022	.020	.022	.022	.022	.022	.022	.023
S.S.S. No. 6	.005	.006	.003	.007	.004	.008	.006	.010	.006	.010	.008	.011	.009	.013
Untreated No. 7	.008	.013	.013	.016	.015	.017	.018	.021	.018	.021	.018	.023	.018	.026
S.S.S. No. 8	.003	.005	.008	.007	.008	.008	.009	.010	.010	.010	.010	.010	.011	.011
Untreated No. 9	.010	.016	.010	.019	.016	.025	.019	.030	.023	.035	*Rail renewed 1/8/23			
S.S.S. No. 10	.008	.005	.009	.006	.010	.007	.012	.007	.012	.008	.012	.008	.012	.010
Untreated No. 11	.010	.006	.011	.008	.012	.009	.014	.011	.015	.011	.014	.011	.014	.011

*Renewed on account of uneven wear. Inner rail worn 0.038 and outer rail worn 0.039 when removed.

chemical composition in the various tests was as follows:

Elements	Haverhill and Causeway Streets, Southbound	Haverhill and Causeway Streets, Northbound	Henley Street	Rollins Street
Carbon	0.850	0.850	0.930	0.880
Manganese	.75	.75	.80	.71
Phosphrus	.036	.037	.035	.029
Sulphur	.048	.048	.058	.067
Silicon	.20	.20	.20	.20

Note: A few individual rails from different rollings had chemical compositions varying slightly from the above figures.

Three samples were selected for making the Brinell tests. On sample No. 1 this test in the head of the rail gave values of 351 and 340. In the base of the rail it gave a value of 351. In sample No. 2 the values for the head of the rail were in each case 364 and in the base of the rail the same as in the first sample, namely, 351. Sample No. 3 gave two values of 418 in the head of the rail and a value of 387 in the base. The locations where these tests were made are shown in an accompanying illustration.

Briefly described, the process of hardening the rail at the mill consists of quenching by compressed air a red hot rail after it has gone through the last regular rolling. A long pipe with a series of vents in the bottom is suspended immediately above the rail and the compressed air released through these holes. A difficulty which it is understood sometimes is encountered in the process is the bending of the rail when being quenched, which necessitates its being put through the rolls again. It is understood that the manufacturer is not in a position at the present time to supply this rail in large quantities.

Service tests have been carried on in Boston for the past two or three years and the results have been excellent both as to wear and as to non-breakage of the rails. Some doubts were expressed at the beginning of the tests as to whether or not this process would cause brittleness, but inasmuch as tests were made on curves of very short radius and the rails were curved cold, the company feels that the rails received a thorough test. No breaks at all have occurred to rails in tracks. The extra first cost amounts to practically nothing compared to the cost of renewing rails at frequent intervals.

The Boston Elevated Railway considers the results achieved on its rapid transit lines so satisfactory that it is endeavoring to have all rails for installation on curves treated by this process before leaving the mill. It is believed by the company that this process is equally applicable to rails used in surface tracks.

Sandberg sorbitic rails have been used also to some extent by the Interborough Rapid Transit Company, New York City; the Philadelphia Rapid Transit Company, the Denver Tramway and the Cumberland County Light, Heat & Power Company, Portland, Me. Various steam railroads have also used these rails, and the Pennsylvania Railroad carried on extensive tests to compare them with untreated rails.

Electric Railway Industry Prospers

A Survey of Recent Financing, Operating Results, Receiverships Lifted, New Track Construction and Purchases of Rolling Stock, Covering the First Six Months of This Year, Shows the Excellent Condition of the Industry—Railways Are Taking Up Operation of Buses

WHILE there has been a general feeling that the electric railway industry is once more sound and progressive, and numerous articles have been published within the past year to that effect, a large part of the general public, as well as many operators and manufacturers in the industry itself, have failed to visualize the tremendous advance it has made since the hard times of the post-war years. The editors of ELECTRIC RAILWAY JOURNAL have recently gathered together and summarized a great mass of material, all of which has appeared in this paper from time to time, and here present part of it, and that in summarized form.

It is not necessary to go into the really fundamental reasons for belief in the soundness of the industry. Factors contributing to the improvement in the situation are definite breaking down of the 5-cent fixed fare, elimination of irresponsible jitney competition, the greatly improved public relations, the general realization of the necessity for high-grade service, and the new appreciation of the necessity for merchandising service. These fundamentals are already well fixed in the minds of the public.

First the financial side of the industry will be considered. For several years investment bankers have been strictly bearish on electric railway securities. Some have even taken pains to note on prospectuses of light and power company issues that the property in question has little or no railway operation. These and other acts have assisted in building up among the investors a psychology which has caused a great many combination power and railway companies to change their names to eliminate the evidence in the corporate title of the inclusion of any railway property as a part of the company.

But this line of thinking has run its course. The bankers are beginning to take an interest in electric railway issues. The railway companies are helping this by the spread of the work of selling securities to local people on the customer-ownership idea. As definite evidence of this increasing interest, a few cases will be cited.

During the last twelve months the Electric Bond & Share Company, which has heretofore been interested almost exclusively in light and power companies, has purchased the New Orleans Railway & Light Company, the Birmingham Railway, Light & Power Company, the Memphis Street Railway, and has recently completed the purchase of the American Electric Power Company, formerly the American Railways, whose holdings included the Scranton Railway, Peoples Railway of Dayton, Wilmington & Philadelphia Traction Company, Roanoke Traction & Light Company, Chicago & Joliet Electric Railway, Ohio Valley Electric Railway, Huntington, W. Va., and several other properties which comprise electric railways.

This indicates that this conservative holding company sees a real opportunity to make money on railways or it would never have purchased them, for it has been an organization heretofore definitely not interested in railway work.

J. K. Newman has organized an investment banking house, known as Newman-Saunders, which has purchased control of the bonds of the United Railways of St. Louis and the Kansas City Railways, both of which are now in receivership. The St. Louis railway system showed an increase in net earnings of more than $300,000 in 1923 as compared with 1922, and its rehabilitation program has only begun. Furthermore, it has not only paid all its bond interest to date, including that on some bonds which have been extended at high rates, but has accumulated a surplus of more than $4,000,000. Under better management the Kansas City Railways in the last three years has changed from a net operating deficit of $1,500,000 to a net income of more than $500,000, an increase in the annual net income of more than $2,000,000. This is the showing made in spite of the fact that the company has paid off nearly $20,000,000 in accumulated liabilities.

The Atlantic Coast Electric Railway has been bought by Fitkin & Company.

The Northern Ohio Traction & Light Company has purchased the Cleveland, Alliance & Mahoning Valley Railway.

The General Gas & Electric Company has purchased the Salisbury & Spencer Railway.

The Interstate Public Service Company has purchased the Winona Interurban Railway.

The Indiana Service Corporation has offered to purchase the Fort Wayne & Northwestern Railway.

The West Penn Company has bought control of the Monongahela Valley Traction Company.

The Virginia Western Power Company has bought the Charlottesville & Albemarle Railway.

While some of these purchases included light and power operations, they all include substantial railway properties, which indicates that each purchaser was convinced that it could place the railway on its feet, if it were not already there, and make it a paying proposition.

SECURITIES TOTALING MORE THAN $48,000,000 ISSUED

As further evidence of the growing interest of bankers in electric railway securities, the following security issues may be cited as some which have been successfully floated so far this year:

Market Street Railway	$13,000,000	7 per cent bonds, sold at par
Grand Rapids Railway	3,200,000	7 per cent bonds, sold at 99½
Pittsburgh Railways	3,000,000	5.22 per cent to 6 per cent car trust certificates
Chicago Rapid Transit Company	6,500,000	6½ per cent bonds, sold at 94½
New Orleans Public Service, Inc.	7,500,000	8 per cent common stock, sold at par
(The railway operation in this company is earning the full allowable 8 per cent return)		
Maryland Electric Railways	4,000,000	6½ per cent bonds, sold at par
Boston Elevated Railway	3,000,000	6 per cent bonds, sold at 103.
(These traction bonds were returned to the legal list for savings banks in Massachusetts)		
Charleston Interurban Railway	500,000	6 per cent stock, sold locally at par
Key System Transit Company	2,410,000	6 per cent bonds, sold slightly under par

In addition to the above the Chicago Rapid Transit Company is now selling $5,000,000 of 7.8 per cent prior preferred stock to its employees at 90 and to the public at par. The employees promptly took up $1,500,000 of this and the company is meeting with good success in selling to the public, more than half the issue already having been taken. This is the outstanding customer ownership effort to date in the electric railway field. In addition, the Galveston-Houston Electric Company has sold $400,000 of 7 per cent notes direct to the public. The total of all of these railway issues amounts to more than $48,500,000, and this is by no means a complete summary of the new electric railway financing done this year.

In New York City, which has the most difficult political situation in the country for traction lines, the Brooklyn City Railroad has returned to a 10 per cent dividend basis and has recently declared a 33⅓ per cent stock dividend, which last week was approved by the Transit Commission. The Brooklyn-Mahattan Transit Corporation declared an initial dividend on preferred stock which was paid May 15, although this was not compulsory under the terms of the reorganization plan until 1925.

Among the annual reports published so far this year the Twin City Rapid Transit Company, Minneapolis; the York Railways, York, Pa.; the British Columbia Electric Railway, Vancouver; the Columbus Railway, Power & Light Company, Columbus, Ohio; the Chicago, North Shore & Milwaukee Railroad; the Chicago Surface Lines; the Hudson & Manhattan Railroad; the Duluth-Superior Street Railway; the United Railways of St. Louis, and the United Railways & Electric Company of Baltimore have all shown substantial increases in their net revenue. Of course, a few reports which have been published have shown decreases in net, but there were special reasons for some of these, such as bad strikes. In general the most of the reports show an increase.

SEVERAL IMPORTANT RECEIVERSHIPS LIFTED

Among the more important receiverships which have been lifted from electric railway properties so far this year are the following: Pittsburgh Railways; Birmingham Railway, Light & Power Company; Binghamton Railway; Northern Massachusetts Street Railway, Greenfield, Mass; Winona Interurban Railway, Warsaw, Ind.; Chicago & Oak Park Railway; Toledo & Western Railroad; Coney Island & Brooklyn Railroad, New York City; Northampton-Easton & Western Traction Company, Easton, Pa., and New York Railways.

In addition the properties at St. Louis, Kansas City, and Erie, Pa. (the Buffalo & Lake Erie Traction Company), will most likely be reorganized soon and emerge from receivership, as will the Second Avenue Railroad, New York City.

New receiverships this year so far comprise only four small companies, as follows: Grand Rapids, Holland & Chicago Railway; Ithaca Traction Company; Charleston-Isle of Palms Traction Company and Columbus, Newark & Zanesville Traction Company. This would indicate that the year 1924 would see even fewer receiverships than the number in 1923, which was 12, and that was the lowest in any year since 1910.

So much for strictly financial evidences of the soundness of the industry. Now what is the tendency in the amount of traffic handled by the electric railways? Figures compiled by the American Electric Railway Association comprising 400 electric railways, representing more than 80 per cent of the whole industry, show that during 1923 the number of passengers carried was 13,280,730,742, as against 12,822,423,121 in 1922, an increase of 3.6 per cent. Corresponding figures might be cited on the number of car-miles operated and the gross revenue also, but they all point to the same thing, namely, that in 1923 the electric railways carried more passengers, operated more cars and more car-miles, and had the greatest gross revenue in the history of the industry. There is in sight no other means of transportation that can undertake to supplant the electric railways in this tremendous job of handling 16,000,000,000 passengers a year. Nor is there any evidence in this great number of passengers carried that electric railways are on the decline. These figures are even more significant when one stops to think that in 1923 there was a total registration of more than 15,000,000 motor vehicles.

PER CAPITA RIDING HAS INCREASED

Analyzing these traffic figures a little further, a special study made by John F. Layng, published in ELECTRIC RAILWAY JOURNAL for June 28, page 1011, showed a comparison of the number of revenue passengers per capita and revenue passengers per car-mile carried by the electric railways in the years 1910, 1920 and 1923, for 45 companies scattered over the country and in cities of various sizes. Of these 45 companies, 27, or 60 per cent, showed an increase in the number of revenue rides per capita in 1923 over that in 1910, and 37 companies, or 82 per cent, showed an increase in revenue rides per car-mile operated. Totaling the figures for revenue miles and revenue passengers for all 45 companies, it will be found that the revenue rides per capita in all these cities increased from 223 in 1910 to 244 in 1923, and the revenue rides per car-mile increased from 5.54 to 7.12. The real significance of this is that every inhabitant of all these cities rode on the street car 21 more times in 1923 than he did in 1910, in spite of the fact that the total registration of motor vehicles increased from 470,000 in 1910 to 15,092,177 in 1923.

SIX MONTHS' TRACK CONSTRUCTION ESTIMATED AT $85,000,000

Another evidence of the soundness of the industry is the extent to which it is buying. Taking the material that has been published in the JOURNAL so far this year as a basis, it is found that there have been published 126 news items concerning new track construction or reconstruction, involving an estimated total of 1,142 miles of single track, at an estimated cost of $85,000,000. Of the total number of track items, 63 included paving work, totaling about 2,550,000 sq.yd., the cost of which is included in the above estimate. This 1,142 miles indicates that track construction compares with a total during 1923 of 1,114 miles. Of course, this new figure is for work authorized, while that for last year was track actually built or rebuilt during that year. A comparison with similar items published last year, however, indicates that the track built in 1924 will be much in excess of the amount of construction that was carried out last year.

In the first six months this year the JOURNAL published 194 news items telling of the purchase or prospective purchase of cars, trolley buses and buses by the railways. The number of items indicating prospective purchases comprised 946 cars, 12 trolley buses and 27 buses. The items telling of orders placed comprised 1,731 cars, 2 trolley buses and 298 buses.

Other important projects that are now under way involving large expenditures include the $4,000,000 Babylon electrification of the Long Island Railroad, the $10,000,000 authorization in connection with the Illinois Central Suburban electrification, the electrification of the Staten Island Rapid Transit Company, the electrification of a piece of the Missouri, Kansas & Texas Railway, for which $1,000,000 has been authorized, and the Hollywood tunnel contract, which has been let with an expenditure of $3,000,000. The Boston Elevated Railway has announced a five-year program, including $4,500,000 for a new elevated shop, $4,000,000 for surface lines shop, $3,000,000 for station improvements, $3,000,000 for new steel "L" cars, $3,000,000 for "L" storage facilities, and miscellaneous planned improvements $7,400,000—a total of $24,500,000 to be spent on these items alone during the next five years. Of the $5,000,000 stock issue now being sold by the Chicago Rapid Transit Company, $3,000,000 is to be spent for important improvements, including 100 new steel cars. The other $2,000,000 is to be used for refunding purposes.

RAILWAYS ARE ADOPTING THE BUS AS AN ALLY

Railways are now putting the newest transportation tool, the bus, into use as an ally before it has become a serious competitor. They are beginning to buy buses, but the job is only well begun. Up to date about 150 railways have taken up bus operation in a small way, including several very sizable undertakings. They are operating at least 2,000 buses. Obviously, this is thus far mainly in the nature of a feeler as to the possibilities.

The leaders of the industry see the field of the bus and are now of the belief that, if the railways take advantage of their present opportunities, they will be the operators of the great bulk of the buses of the future. Very definite steps are being taken to harmonize the thinking of the railways and that of the bus manufacturers and the bus industry generally, and substantial progress has already been made. This is coming fast, for the bus manufacturers have been quick to see the railway field as an enormous future market. To cite just one example, at least one large bus manufacturing company has stated that it is definitely aiming its main sales efforts at the railways.

The possibilities of the use of the bus are almost without limit. There will be bus lines everywhere, affording ready means of direct communication where none now exists. They will very naturally feed business to steam and electric rail lines for the longer hauls. The railway people are the logical ones to develop this field, because they know transportation. They can also bring about the bus development in the way most effectively to increase the earnings of the rail lines. They can even parallel their own rail lines with a de luxe type of service that will develop riding that never could be secured for the railway, and it has been done in several cases at rates higher than those charged on the railway.

The picture which these figures present is not complete. It is not intended to be complete. In no way do the data from which they were drawn compare with the results of the exhaustive survey from which the figures are compiled that are published annually by ELECTRIC RAILWAY JOURNAL gathered from both railway companies and car manufacturers. It is, however, concrete evidence that shows the rapid strides being made by the electric railway industry in its modernization program.

Association News & Discussions

Central Association Considers Methods of Increasing Business

At the Cedar Point Meeting Freight and Passenger Business and Public Relations Are Main Topics—Improvement in Financial Situation Shown

DETERMINED to look on the bright side of the future of the electric railway business in the central district and in the nation at large, the C. E. R. A. devoted the program of its summer meeting, held on July 17 and 18 at Cedar Point, Ohio, to a discussion of ways and means of increasing passenger and freight business. Being a large factor in this program the subject of publicity occupied a prominent place in the discussion.

President Harry Reid, president Interstate Public Service Company, opened the Thursday morning session with a brief outline of the general situation as it stands today and took an optimistic view of the future of the industry. He said that the affairs of the association are in excellent condition and that committees have been functioning in a whole-hearted effort to cooperate in working out the problems of the industry.

Although the current year started with general increases in business, Mr. Reid said that most of the companies in the central district have been feeling some effect from the general slackening of industrial activity. He anticipated, however, a general recovery by fall which will give a more favorable showing for the entire year than is indicated by the results achieved during the past few months.

Continuation of the movement for progress and modernization was advocated as an essential policy to insure future prosperity. The various companies must take care fully of the territory served and must expand their facilities to meet the desires of the riding and shipping public. Improved equipment and auxiliary transportation agencies, such as the motor bus, were advocated where their use will help the railway maintain its leadership as the exclusive transportation agency in a given field.

Citing the experience of the Interstate Public Service Company in adopting dining and club cars for service between Indianapolis and Louisville, Mr. Reid said that he was convinced that these improved facilities for the convenience of the traveling public were profitable to the railway. Their use has increased the aggregate earnings of the road both through the direct patronage which they attract and also because of the favorable publicity which they give.

The report of Secretary L. E. Earlywine showed a membership on July 1 of 62 interurban lines, 4 city properties and 2 steamship lines. Reports of the committee on rules for the interchange of equipment and of the committee on annual transportation were accepted by the association. A resolution was adopted tendering sympathy to the family of Past-President C. N. Wilcoxon, whose death was recently reported in the ELECTRIC RAILWAY JOURNAL.

The report of the safety committee, which was approved by the association, advocated medical examination of employees, investigation of the moral standing of new employees, careful training of men, personal talks by executives to raise the morale of the men in the ranks and careful supervision and checking of older employees so as to maintain high efficiency. Painting of diagonal black and white stripes across concrete roads at railway crossings was recommended.

PUBLICITY GIVEN PROMINENT PLACE

E. F. Wickwire, chairman publicity committee, opened a general program devoted to this subject by a report from his committee. After outlining the general principles, he advocated coordination of the efforts of the C. E. R. A. with the work which is being done through the American Association and urged each company to make use of the carefully prepared material which is sent out by the national association.

W. H. Boyce, commercial manager Pittsburgh Railways, described some of the publicity methods used by both this company and the Beaver Valley Traction Company, of which he was formerly general manager. His paper is abstracted elsewhere. Mr. Boyce supplemented his paper by showing examples of effective and constructive publicity material used by the London Underground Railways, the Chicago Rapid Transit Company and the Pittsburgh Railways.

In discussing Mr. Boyce's paper, W. H. Sawyer, president East St. Louis Railway, said that the day has passed for advocating the need for publicity, and that present-day effort should be devoted to discussion of the best methods of carrying out constructive work along these lines. Since so many examples exist of properties which have been saved from ruin by constructive publicity, Mr. Sawyer said that a railway executive who does not recognize the value of such work now has no place among progressive electric railway people.

"The Pittsburgh strike was won by constructive publicity, and the winning of that strike was of national benefit to us all," said Mr. Sawyer. "True, it was publicity backed up by performance—backed up by men who meant what they said and said what they meant—but that is what all publicity must be. Unless backed by performance, publicity is useless and worse than useless." Publicity work by a railway was held to be equally important with any other departmental activity. For this reason it should be considered as a distinct department, ranking equal with any of the regular operating departments of the organization.

Labert St. Clair of the American Association staff and representatives from the committees on public utility information in Indiana, Ohio and Michigan discussed the subject of railway publicity. Mr. St. Clair said that the function of the American Association was primarily to tie together the activities of all other agencies, and he offered the Central Association the full co-operation of his department. That railways are making publicity for themselves all the time, whether or not they are engaged in active work along these lines, was brought out by one of the speakers. Every time a passenger and a conductor make contact a certain publicity reaction is obtained, and it was consequently held that the progressive executive will take active steps to make sure that the public is so informed regarding the business of the company that it may correctly judge the value of the service which is rendered.

G. Bennett, general agent Chicago, North Shore & Milwaukee Railroad, outlined some of the principles applied by that company for building public good will and increasing passenger traffic. J. C. Matthieu, commercial engineer Dayton Power & Light Company, read a paper on methods used for increasing the light and power business. He also held that an improvement in public relations is the surest method of increasing the utility business and advocated full publicity on all phases of the industry.

In a paper on the subject of forestry conservation by David L. Goodwillie he pointed out the many ways in which this work affects the prosperity and happiness of the nation.

ENGINEERING COUNCIL

The afternoon session was devoted to the meeting of the Engineering Council of the association, with Chairman G. K. Jeffries presiding. The two papers presented and the moving pictures on the manufacture of steel wheels provided an opportunity for constructive discussion on the part of the members and guests present. The first paper, read by K. A. Simmon, manager light traction division Westinghouse Electric & Manufacturing Company, gave some of the details of the organization of the Engineering Council of the association. It is abstracted elsewhere in this issue.

The discussion following the question raised by Mr. Simmon as to how to obtain a larger attendance at regional group meetings resulted in a motion to have the chairman of each group write a personal letter to the general manager of each property included, asking him to order men to attend the group meetings. In supporting this motion, A. V. Brown, Lake Shore Electric Railway, brought out the fact that many members of the Engineering Council were too backward in advising their managers of the scheduled meetings, with the result that often these men waited in vain for the officials of the property to tell them to attend. A. Schlesinger, Terre Haute, Indianapolis & Eastern Traction Company, suggested that standing orders be issued by general managers making it imperative that the members of the council attend the group meetings. He said that inasmuch as the council was divided into four groups, it was easy for a man to attend a group meeting without being absent from his property for more than a day.

High-tension insulators, their application and economic installation, were the subject of a talk by Arthur O. Austin, chief engineer and factory manager Ohio Insulator Company and consulting engineer Ohio Brass Company. He went into considerable detail in analyzing the various factors which determine the proper type and construction of insulators which should be used to obtain the best results.

An interesting description of the manufacture of rolled steel wheels was given by Lawford Fry, metallurgical engineer Standard Steel Works, with the aid of moving pictures. The committee report on "Standardization of Freight Equipment for Interchange, the Development of Limit Gages and Rules for Application" was presented for formal approval. After some discussion it was deemed advisable to approve only sections 1, 5, 6, and 7. The sections dealing with standards, determination of capacity and capacity markings, and limits for wear gages were referred back to the committee for further consideration.

Friday morning's general session was opened by a paper presented by L. M. Brown, superintendent Interstate Public Service Company. This paper outlined the work of his company in dealing with the increase in the freight business experienced by the railways around Indianapolis. An abstract of the paper is printed elsewhere in this issue.

"What Does the Interurban Electric Railway Mean to the Economic Development of the Central West," was the subject of a paper presented by Joseph A. McGowan, Terre Haute, Indianapolis & Eastern Traction Company. This paper is abstracted elsewhere in this issue.

The talk given by J. P. Harris, vice-president Union Trust Company, Cleveland, Ohio, proved an inspiration to his listeners. Stating that he was optimistic regarding the future of the traction business, he gave many reasons why he advised his clients to invest in public utility securities, particularly those of electric railways. Paramount among the reasons advanced was the necessity for transportation in a community in order to insure its growth. With this fact established in the minds of investors and the bankers, the demand and price for traction securities should improve materially. Mr. Harris pointed out that the value of a municipal security depended largely on the service rendered by the local transportation company, so he argued that in many ways the bonds of the latter should be as good as if not better than the municipality's. The trouble in the past with the public utilities, and particularly the electric railways, has been due to the actions of unscrupulous promoters who have made the traction companies susceptible to blackmail by the city officials.

One electric railway, that, after it became the property of the bondholders, was put on its feet by his bank with the result that it was returned to a public utility operating company at a profit to the bank was the example Mr. Harris used to show what could be done with traction lines. This system was similar in many respects to others operating at that time and even today. The cars were 28 years old, the track was worn out, no franchises were held in the towns through which the line ran, and in other ways the property had suffered due to the war and the neglect of the former operators. The first step in the rehabilitation work was the determination of the worth of the property. This was done by experts, and upon their advice new cars were purchased, the track was put into good condition and the power facilities improved. With this work well under way the bank's representatives sought to obtain franchises in the various towns. After a two-year fight to make the town authorities extend to the railway the cordial wlecome and respect accorded to other industries franchises were obtained wherever needed. This was accomplished by holding up the money to be used in the community until the town council issued the franchise and treated the company in a proper manner. After operation had started and the property was assured of a successful future the bank sold it to a public utility operator at a price higher than the total investment including the interest charges after only ten minutes of negotiation.

The Thursday evening banquet was attended by almost 300 members and guests of the association. A lively program of entertainment was followed by a talk by Robert G. Gordon of Louisville, who explained some of the salient facts connected with the controversy over the development of Muscle Shoals.

The executive committee of the association approved a recommendation from the traffic association in favor of a combined freight advertising program. The conference called by the Governor of Ohio on July 23 to consider the subject of grade crossing safety was also discussed by the executive committee, and a special committee was appointed to handle some of the details of presenting the electric railway view on this subject.

Dayton, Ohio, was selected as the place for the next meeting of the association, which will be a two-day session to be held next January.

What Are We Doing to Increase Our Freight Business?*

BY L. M. BROWN

General Superintendent Interstate Public Service Company,
Indianapolis, Ind.

FOR a number of years the lines reaching the larger terminals in the C.E.R.A. territory have been greatly handicapped in the handling and solicitation of freight business by the lack of adequate station and terminal facilities, which has in a great measure restricted the development of this phase of operation, and much tonnage which might have been moved by electric lines was lost to other means of transportation, including the motor truck. However, there has been a marked tendency during the past year to increase station and terminal facilities, and it is understood that improvements of this nature are contemplated or are under way at many points.

Probably the most notable accomplishment in this direction during the past year was the completion and putting into operation on June 1 of the first unit of the new million-dollar Indianapolis joint freight terminal, which is now occupied by all of the interurban lines entering Indianapolis. This terminal has platform track capacity for more than 80 cars at one time, and team track capacity for 30 cars; also ample storage tracks. The buildings are modern in every respect and equipped to insure prompt and economical handling of freight and facilitate the transfer of interline tonnage at a minimum cost. The combined length of the present station buildings and platforms is approximately 1,300 ft. with ground available practically to double this when necessity demands.

Many other steps have been taken by electric lines in the territory, both individually and collectively, to increase the freight business, including the organization of more efficient traffic departments to develop and solicit business, extending the scope of freight operation through the establishment and publication of through interline rates and divisions, and arranging through connecting line schedules. Much attention has been given to the matter of maintaining fast and dependable through interline service, and a great deal has been accomplished in this direction, with the result that overnight service is rendered covering a large part of Central Electric territory, and second morning delivery between the more widely separated points. Shipments of both carload and less are moved for distances as great as 400 or 500 miles, and service rendered is comparable with or even better than where shipped via American Railway Express.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Association, Cedar Point, Ohio, July 17, 1924.

On the line with which I am connected there has been a very satisfactory increase in freight earnings so far this year, notwithstanding the general depression in practically all lines of business. This has been brought about, we believe, by fast, dependable service, personal touch and solicitation by the traffic department, co-operation of agents and other employees with the public, establishment of industrial switches and filing of commodity rates.

The giving of real dependable service cannot be successfully accomplished unless the entire organization, including platform men and trainmen as well as the solicitor is sold on the idea of service. It is not enough to solicit the business and then forget it, but it must be followed up until the customer is convinced that the service is all that it is claimed to be. One mistake or delay on a trial shipment may cause the loss of several hundred dollars worth of business which may never be regained. In taking on new business of any importance we always make it a rule to spare no efforts to make the service absolutely first class in every respect, even though it costs us money to do so. After the service has once been satisfactorily established economies of operation can be put into effect and the public served is willing to cooperate in improving the service and to report mistakes or delays so that they can be corrected promptly. If one of our patrons has an interruption to his business and asks some special favor, we go out of our way to accommodate him. We have found that special attention to matters which may seem trivial to us but of great importance to the other fellow is one of the best business builders.

We have a sufficient amount of motive power and rolling stock, forty-seven additional cars having been added within the past year, which enables us to take care of calls promptly, especially for car load shipments. About one-third of our total freight revenue is derived from car load business. Outside the larger cities trains of from five to twelve cars are operated which reduces train labor costs, facilitates dispatching, etc.

A few years ago we started a special fruit service from southern Indiana to Indianapolis. This business has increased so that from two to seven cars are operated daily carrying berries, fruits, green vegetables, melons and other perishable commodities for about five or six months in the year. This train leaves the southern end of the line about 9 p.m., arrives at Indianapolis about 2 a.m., is immediately unloaded and contents delivered to the commission merchants and sold in time to be on the breakfast table. For this service an all-steel, high-speed motor car and special steel trail cars with steel wheels for fast running are used. With these specially constructed steel express trail cars which can be operated behind limited trains, we recently added to our list of perishable products a new commodity. In a period of about eighteen days approximately 11,000,000 tomato plants were handled from two stations on the line with a gross revenue of more than $2,100.

Industrial switches have been established at such places as canning factories, cement mills, wood-working factories, for road contractors and others. Recently a large stone quarry on the line has been leased for commercial use which will give us several hundred carloads per year. Several hundred cars of sand and gravel are already being handled for road building purposes.

All the lines entering Indianapolis handle a large amount of livestock into and out of that city, almost 12,000 cars having been handled last year. Recently our line made a connection into the stock yards at Louisville, which gives us stock yard facilities at both ends of the line. A part of the stock cars have been double decked, which increases the revenue per car and reduces cars per train. This results in more economical operation. A special livestock solicitor devotes his entire time to this business. Through the solicitors and with the co-operation of the agents, the traffic department keeps in close personal touch with all lines of industry in the communities served. Frequent meetings of the agents, heads of departments and clerical forces are held, and at these meetings general conditions are discussed and suggestions for improvements in service are made. We also have a special women's committee made up of the women employed by the railway, who meet regularly to discuss public relations and other matters pertaining to the railway.

A prominent industrial traffic manager in the Indiana territory makes these suggestions, from a shippers' viewpoint, as to how the traction lines may increase their freight business:

The business which the traction lines may secure will be divided into two classes:

1. That which has been established and is now moving regularly, either by steam road, traction or truck.

2. New business which may possibly be developed.

As to the first class, it is becoming evident that the freight business must contribute an increased proportion of traction line revenue. The very pronounced increase of late years shows what can be done. The highly organized steam line and unorganized truck are still after the business, but superior service will get the traffic of the future just as it has in the past.

Prior to September of 1917 the scale of class rates in the central territory was very low, but even under the low rates the traction lines laid the foundations for an improved service, which together with an indifference on the part of the steam carriers, enabled them to secure a very substantial tonnage.

The present rates would appear to be remunerative and if the traction lines can build up such a tonnage under adverse circumstances they certainly can do still better under present conditions.

From observation a few suggestions are offered which we believe would attract traffic:

A system whereby expense bills would be in the cashier's hands immediately after the freight is unloaded—a dual waybill—expense bill form might be adopted.

A careful effort to locate the consignee before shipment is placed in storage.

A reasonably liberal policy in handling loss and damage claims more nearly in line with that adopted by the steam roads.

As to the second class the proposition of creating new tonnage appears to be much more difficult than that of getting the established and steadily moving traffic away from competing agencies. A survey of the products of the territory adjacent to the lines might be made and if the lines could jointly form some agency for disposing of these products it might be possible to increase this movement via a joint truck and traction arrangement.

It is generally conceded that in the future development of the freight business on electric railways there is still room for further improvements in working out connecting schedules, the loading of through package cars, the elimination of delays at transfer points, etc. It has been suggested that there should be some organization of the operators themselves to get together frequently to work out through schedules and otherwise improve the service.

The lack of industrial sidings causing the shipper to pay cartage charges to the electric line when he can get a steam road car at his own door and the fact that truck operators make door to door delivery at electric line rates or lower, has created a problem that is not easy of solution. It is known that some lines have under consideration a pick up and delivery system at certain points to meet such competition. Where rates have been established with trucks which act as feeders to the railways this service has been found to be both satisfactory to the shippers and a source of added revenue to the railway. There is opportunity for development here.

In addition to increasing the volume of freight business, much of the success of freight operation depends upon the economies which can be inaugurated in handling, not only at terminals and stations, but also on the road. The selection of motive power suitable to the service to be performed is important and may be the means of materially reducing operating costs, especially labor, through the handling of longer trains, and facilitating movements over the line. It has been found that material reductions in operating costs may also be made by giving special attention to proper distribution of cars, reducing non-revenue or empty car or train mileage, etc., thus adding to net results, which after all is the principal incentive for operating freight service.

That freight business, properly and economically conducted, is not only desirable but highly remunerative needs no further proof than the results obtained by many electric lines in the territory.

What May Be Accomplished by Constructive Publicity*

BY W. H. BOYCE

Commercial Manager Pittsburgh Railways

METHODS employed in dealing with the public are, of course, largely dependent upon local conditions, although there are certain rules of the game that must be pretty generally observed no matter how small or how large the communuity served. I think I can best illustrate this point by saying that a southern railway manager told me that he had been taken to task, rather severely, for some of the material that had appeared in the company publication that is distributed in the cars, his Eastern bankers taking the position that the material was not dignified enough and complained because they had not seen therein articles along certain lines that would have interested them. This manager finally convinced his people that if the publication was of a nature not to suit them, it was just exactly what was needed for the type of people in his district and from whom the railway company received a large portion of its earnings. He stated further that if ever the publication did get so it would suit them he hoped they would notify him at once, as he would then have to make some radical changes.

A few years ago a number of companies conceived the idea of employing press agents who attempted, through various methods, to have inserted in the newspapers articles regarding the financing and operation of their companies. The public was quick to sense the origin of such articles. Today it is pretty well understood among utilities that the "paid for" advertising space is the proper method to employ in putting over our case with our public. Of course, I do not mean by that that a company should not give all the information necessary for a reporter of any paper to write an article concerning the operations of the company, but I do mean that all of the facts should be laid on the table.

To my mind all of the public relations work, from the dealing with the individual car riders to the membership of the civic and municipal bodies, in a great measure comes under the head of publicity, either verbal or written. Constructive publicity is publicity with a punch designed to sell the idea of safety, a car ride, bonds, an idea, good will, your operating or financial problems, or what not. It may be put out in the form of really truly news stories, newspaper advertising, copy for car cards, posters, pamphlets, bill boards, novelties and, by no means last, through the spoken word. It is publicity prepared with much care and viewed and criticised by several members of your organization. It is publicly based upon "the truth, the whole truth and nothing but the truth." It is honest and does not forget the human element among employees and patrons. It invites friendliness by being friendly, and solicits constructive criticism. If it is street railway publicity it is in direct competition with the advertising of "Rears-Sawbuck," the United States Mail, the "Well Belephone Company," jitneys, freight and passenger buses, trucks, about fourteen million autos and Fords, and the shoe leather express.

It will let your public know of the mutual concern and responsibility of public and public utility management. It will teach your patron that he is not giving you a certain number of dollars per month or year, but that in many cases you are giving him more dollars in the form of service than you receive in cash from him. It will not speak of educating your public, but it will give all the facts and let the public decide who is right or wrong. It will help secure the hearty co-operation of all employees, but you must keep everlastingly at it.

Constructive publicity for the Beaver Valley Traction Company, with which I was formerly associated, put its employees in such a frame of mind that they loaned the company many thousands of dollars one year when the bond interest was due. It made more courteous, polite, attentive salesmen of our trainmen. It put our public in such a frame of mind that we were able to abolish workmen's two-for-5-cent tickets, go to a straight 5, then a 6-cent, then a 7-cent fare, and finally a revision of zone lengths from 6 miles down to 2 miles (providing a 28 per cent increase in revenue), all without having to face a complaint filed by a citizen, or corporate, or civic body of the thirteen boroughs and townships served.

In Pittsburgh during the past five months it has kept our earnings above the point that we could reasonably expect them to reach, considering the mercantile trade and base industries indices. It has brought crowds to our zoo and art galleries and to the parks.

The Commercial Department of the Pittsburgh Railways was formed because in the judgment of our president and our general manager there existed as much need for a selling organization on a street railway property as in a manufacturing organization. This department is responsible for the quality and quantity of service, public relations and advertising. It is headed by the commercial manager, assisted by a director of traffic promotion, under whom is the traffic department, a director of public relations and his assistants and the general ticket agent and his branch agents. When new cars are purchased or old cars rebuilt this department is expected to make recommendations on body color, interior finish, type of grab handles, seat upholstering and spacing. The superintendent of transportation is furnished information on increasing or decreasing car mileage, the rendering of special service, all special car orders, rates of fare and transfer privileges, and anything that has to do with the sale of transportation.

Through the director of public relations police and traffic matters as well as all complaints are handled, a majority of the latter, no matter how trivial, being adjusted by a personal call upon the complainant. I believe that practice has done more to make friends for us than any other one thing we have done.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Association, Cedar Point, Ohio, July 17, 1924.

Fair Rates and Fair Speaking*

BY J. C. MATTHIEU

Commercial Manager Dayton Power & Light Company

TO INCREASE our light and power business we are striving to give the right kind of service at fair rates and, furthermore, to maintain good, sound public relations. To establish the proper relationship with the public requires the same careful planning and foresight as the other vital policies of your company.

Education of the public is an absolute necessity in the development of satisfactory and sound public relation. Too many people have the wrong impression of our business because they have been misinformed. Education should begin within our own organization for the reason that most of our employees do not understand the problems of the utility any better than the masses, and yet it is largely through the actions and sayings of our employees that public opinion is molded. Consequently, one of our best avenues of approach to the public is well within our control. Take the employees into your confidence and tell them something about your business and they, in turn, will become more interested because it broadens their views, affords new insight and makes them more efficient.

Let the public know what you are doing and what you stand for. If you make an improvement in your service, tell them about it. Use your newspapers. Do a little publicity advertising; you'll be surprised to know how the public responds if you tell the truth. If you have an accident, tell how it happened, the cause, etc. In most cases you are not to blame, so get it to the press as quickly and as straight as possible. The press is anxious for the right information, but you must make it easy for press representatives to get it. Designate some person on whom they may call and feel sure they are getting the right information. The public is fully aware that accidents and interruptions to service will come, and it is only human nature that they should be curious to know the cause. By correctly advising them you gain two points—you satisfy their curiosity and, more important, you educate them in the problems of your business in a manner that is pleasing to them.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Association, Cedar Point, Ohio, July 17, 1924.

Did you ever stop to analyze yourself when you have a tendency to become provoked in a public office? Usually it is due to some minor thing that the employee is doing, perhaps not to you but to the fellow who is in line ahead of you; immediately the entire organization is wrong, at least in your opinion.

Service—that for which we are in business—must be rendered efficiently, courteously and willingly. To do this, our property must be kept in a neat, workmanlike manner; if it is run down in appearance, just so will the entire organization be reflected in the minds of the public.

Possibilities of the Engineering Council*

By Karl A. Simmon

Manager Light Traction Division,
Westinghouse Electric & Manufacturing Company

REALIZING that the diversified operation prevailing in the Central states presents numerous engineering problems that can be solved with the greatest dispatch and reliability among its own members, the association several years ago organized an engineering branch, providing for regional engineering group conferences three or four times per year; these regional groups to be supervised and guided by an engineering council responsible to the executive committee.

It is now universally realized that no matter how brilliant a man may be his knowledge, vision and judgment are improved by contact and exchange of views with his fellows. The opportunity, therefore, for each individual member of the Central Electric Railway Association to become well informed upon transportation matters in general has been set up by his association, and it only remains for each one to make the most of this privilege.

One of the major problems confronting transportation management today is that of developing men capable of assuming and efficiently discharging the responsibilities of departmental heads and their allied supervisory staffs. These engineering and operating group conferences offer one of the very best ways for any individual to become better informed upon operating problems in general.

We are all more or less limited in our vision, although we may not freely admit this and sometimes make the mistake of believing that since we happen to be, for example, in the car equipment maintenance department, and are especially interested in the exchange of ideas with others on that subject, that it is a bore and a waste of time to listen to a discussion on overhead line material or trackwork. There is, of course, some truth in this, but by and large it is an error of judgment, excepting for the man who has no hope or desire to advance in the transportation industry.

One of the basic opportunities of these regional group conferences is to provide a forum for exchange of ideas and practices between the different departments that, of necessity, must co-operate with each other in order to render the right sort of service to the public.

Frequently, the mediocre or negligible results secured by association effort are due to the indifference manifested by the executives of the individual properties. The average man dislikes to tell his manager that he ought to, or wants to attend a meeting, where expense is involved. He assumes that the "boss" knows all about it and will tell him to go and, in the absence of definite instructions, he does not promise to attend, and, frequently, does not attend.

If the best results are expected from these regional group meetings, the individual executives must, by all means, take an interest in them and use these opportunities to find out what value he is getting from them. In addition he is obtaining assistance in developing his own staff personnel.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Association, Cedar Point, Ohio, July 17, 1924.

Getting More Riding*

By G. Bennett

General Agent Traffic Department,
Chicago, North Shore & Milwaukee Railroad

TO INCREASE passenger traffic we must hold our present patrons. This is of the utmost importance, for if new business is acquired while old patrons are permitted to drift away, our efforts in devising schemes for bringing new riders to our line will not show us satisfactory results. The first step toward increasing our passenger business must be in retaining the favor of those patrons who are the foundation for any increase we may promote.

Good, old-fashioned courtesy on the part of all employes is the foremost step toward ultimately bringing traffic up to the ideal of operating capacity. This is just as important as keeping the equipment up to a high standard of operating efficiency. Trains may continually run on time, but if an employee answers a passenger's inquiry in a surly manner, such discourtesy will be remembered, and the fact that the passenger arrived at his destination safely and on time will be forgotten. In other words, a smile and a pleasant word from a ticket clerk, information clerk or train conductor constitute an additional something which induces the passenger to think pleasant thoughts and speak good words for the company.

Operating schedules must be arranged to meet the needs of the community served. Cars and stations must be kept clean and attractive.

When it comes to the actual solicitation of traffic we must remember that this is an age of specialization. To sell service and actually to develop new business it is absolutely necessary at the present time to place your work in the hands of men trained and skilled in the selling profession as adapted to the requirements of particular electric lines.

A great deal of assistance can be rendered to the traffic salesmen and a fine, loyal spirit developed in all employees by offering prizes for suggestions for improvement of service or increasing business. Printed schedules, framed if possible, should be hung in hotels, theaters, lobbies of public buildings and at information booths and at waiting rooms of department stores and at summer resorts. It is well to call on hotel clerks and clerks in information booths to obtain their good will and learn from them of the public attitude toward electric lines.

Frequently valuable suggestions are picked up in such places. Newspapers and certain trade papers should be watched carefully for party movements and movement of prominent individuals. Our experience on the North Shore Line shows that, taking the year round, 65 per cent of special business secured originated from live tips picked out of the newspapers.

Where business houses have employees doing regular traveling, it is well to show the firm members how money can be saved by the purchase of mileage books or other commutation tickets, so that taking the electric line will become a habit. Keep the public at all points along the line informed of amusements or other interesting events which may take place at other points on the line or at points to and from which the line may be available. Many manufacturing concerns and department stores give their employees an annual picnic. These should be solicited for holding at suitable, available resorts served by the electric line.

Business may be picked up through co-operation with motor coach lines by using such lines as feeders. The establishment of through rates with connecting electric and boat lines, and the through checking of baggage with such connections, will result in swinging a great deal of business our way, which might otherwise turn to the steam roads.

In conclusion, it may be said that the chief avenues opening to an increase in passenger business are: First, for us to realize that electric lines are occupying a more important position with the traveling public than ever before, and second, that they have many inherent advantages which should be considered in the same way that any merchant takes an inventory of the goods he has for sale.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Association, Cedar Point, Ohio, July 17, 1924.

How the Interurban Serves*

By J. A. McGowan

Secretary and Treasurer Terre Haute, Indianapolis & Eastern Traction Company

When we are asked what interurban electric railways mean to the economic development of the Middle West, we are called upon to state their contribution to the material resources and the production and distribution of wealth, and the means and methods of living well for the individual, the family and the state. In all these respects, interurban railways have been of incalculable benefit in developing and improving rural districts, small towns and cities. They have extended the city well into the country, and have brought the country into the city. They have created a vast amount of new business by the establishment of new industries on account of the facilities rendered for frequent and rapid travel. If we were content to rest upon past achievements, we might "point with pride," as the politicians express it, to what interurban electric railways have already done within the past quarter of a century. From a few miles of interurban railways in the states of Ohio, Indiana, Illinois, Michigan and Kentucky at the beginning of 1900, there are at present in these states more than 10,000 miles reaching like a great network in all directions, uniting rural districts, towns and cities.

In a commercial way these electric railways have been one of the most important factors in adding to the value of farm lands along their routes, and thus creating new values from which have been derived increased taxes for the building of roads, bridges and school houses. Interurban railways have provided the farmer new markets for his produce by means of frequent and rapid transportation. Figures show that in our Middle West states tens of thousands of employees through payrolls, have received millions of dollars, and these sums have been distributed in all directions, adding to the wealth of the communities served. It is safe to estimate that 250,000,000 passengers traveled on interurban railways in the Middle West states during the past year, while about 5,000,000 tons of freight were hauled. A large part of this passenger and freight business was created by the interurban railways.

In a social way the interurban railways have been of inestimable advantage by bringing to the rural districts all the comforts and conveniences of the city, thus improving living conditions, while at the same time the city dweller is enabled to enjoy the health-giving benefits of the farm and country life by means of the interurban railways extending the boundaries of cities well into the country. Interurban railways furnish commuter service to the smaller towns which the steam roads could not supply at such low fares, and they greatly assist the labor situation by affording easy means of transportation between the country and city.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Association, Cedar Point, Ohio, July 18, 1924.

World Power Conference Begins

The most important engineering feature of the Wembley Exposition in London this year is probably the World Power Conference, held during the two weeks from June 30 to July 12. The attendants included distinguished engineers from nearly every civilized country, and the topics embraced not only the generation and distribution of power, but also its application, particularly in the form of electric power, to various industries, including the railway industry.

At the opening session there was an address by the Prince of Wales, who expressed belief in the benefits which would be derived from international discussion and co-operation in power problems. "It is difficult to conceive any modern industry where power in some shape or form does not play a part," he said. "It forms the one great instrument in the possession of man by which he is capable of extracting from nature everything of value that nature can offer and of converting this material wealth into something of immediate use."

State Versus Private Management

A paper at one of the early sessions by Arthur T. Hadley, president emeritus of Yale University, discussed public versus private management of power plants, a subject which he said is becoming more important because of the increased use of water as a source of power, because this water power is a national monopoly, and because of the recent discussion of an organized nationwide power system under the term "super-power."

The speaker divided industries into two kinds, the standardized and the progressive. In the former, such as the post office or municipal water supply, where a large part of the work is routine, honesty in management is an all-important condition, and the capital invested is either small in proportion to the year's business, as in the post office, or subject to easily calculated depreciation charges, as in the water supply. In the other class of industry, conditions are very different. Much depends on management, the amount of capital involved is large, depreciation cannot be accurately calculated, and a delay in scrapping a group of obsolete machines may convert a real loss into an apparent profit. Among the large industries of the present day, the one which is least standardized and most progressive in its character is the electric power industry.

The history of state railroad management should indicate what results we may expect to reach and what dangers we have to fear if electric power development should be placed in government hands. Only in Russia and in South Africa have government-owned railroads succeeded in earning the full amount of interest on the capital invested, and no operating improvement of importance has ever had its origin on a government railroad system. State railroads have been equally backward in commercial improvements.

One advantage urged for government operation of power plants, Doctor Hadley said, is that they can give lower rates because of their exemption from taxation and because they are not trying to make a profit. As a matter of economic theory, both of these methods of lowering costs are wrong in principle. Exemption from taxation is merely a shift of the burden to other shoulders. It also has a bad effect on the morale and efficiency of government industry. As for the second argument, if government enterprises have been barely able to pay current expenses, they cannot make their rates lower by renouncing a profit which they have never had. There is another objection to this idea that municipal ownership will lower rates. In a progressive industry, where rates are at a reasonable figure through competition or the action of public service commissions, profits are made either by developing new business, which allows the plant to be better utilized, or cheapening the cost per unit. In neither case is there any loss to the public, and the experience of every industry with large fixed capital shows that a reduction of unit cost makes a reduction of rates not only possible but profitable. On the other hand, where profits are limited or not permitted, there is no stimulus for introducting new methods which would lower costs and increase sales.

Other Papers

Secretary Herbert Hoover contributed a paper pointing out that since modern power developments cover a field much more extensive than the limits of any one state, there must be a uniformity and continuity in policy between adjacent states. Thus, administrative interconnection might obviate the necessity of federal intervention in interstate power matters.

General Guy E. Tripp discussed the question of public ownership of power resources and said that the adoption of government ownership of a utility of such tremendous proportions as the power industry would impair public credit and introduce a positive political menace.

William S Murray pointed out the advantages of super-power for railway electrification, as it would give not only adequate, reliable and economic power, but would relieve the railroads of building their own power stations and leave only the financing of the rolling stock and contact systems.

A. Hultquist, secretary Swedish Tramway Association, said the first Swedish horsecar line was built in Stockholm in 1877 and the first electric tramway in Stockholm in 1901. Tramways now consume about 1¼ per cent of the total energy production in Sweden, taking in 1923, 35,442,857 kw.-hr. The speaker said there are at present fifteen tramways in Sweden, with a total length of 374.5 km. (234 miles), 672 motor cars, and the number of passengers carried by all lines in 1923 was 200,621,160.

Uno Forsberg, assistant managing director S.K.F., Sweden, gave particulars of the use of ball and roller bearings on the Swedish state railways. The savings in power effected were from 11½ to 14 per cent. In both Sweden and Denmark, practically all of the modern double-truck railroad cars are equipped with roller bearings.

Committee on Welded Rail Joints

THE executive committee of the committee on welded rail joints held a meeting at the Bureau of Standards, Washington, D. C., on July 18. There were present: Dr. G. K. Burgess, chairman; E. M. T. Ryder, vice-chairman; William Spraragen, secretary; R. C. Cram, E. J. McIlraith, H. M. Steward and W. W. Wysor, members of the executive committee, and H. H. George, H. F. A. Kleinschmidt, E. F. Begtrup, representing J. H. Deppler, Dr. H. L. Whittemore and A. P. Way, members of the main committee. Several of the metallurgists and physicists of the bureau were also present.

It was stated by the chairman that the Emery testing machine to be used for completing the tensile tests had been calibrated and that the completion of these tests will be put through as rapidly as certain rush work for the Navy Department will permit.

The bureau has set up the new repeated impact testing machine, and the committee inspected it. Unfortunately, owing to an unexpected amount of rebound of the hammer, the lifting cam was broken, and this will delay its operation for about two weeks.

Arrangements are to be made for securing some test data as to impact at defective joints in actual service car tests by means of the otheograph device recently installed by the General Electric Company in its test track at Erie, Pa. An offer from the General Electric Company to erect and operate the proposed rotary testing machine at cost, was discussed at length, as were several types of test tracks which might be used to secure similar information as that from the rotary device. No action, however, was taken or is contemplated at the present time.

There was some discussion of the matter of specifications for welding wire used for arc weld joints.

The special committee on examination of broken test specimens inspected the specimens which have been broken in the bend test at Purdue University and the drop test at the University of Illinois and the few that were broken in the tensile test before the Emery machine was dismantled. The nature of fractures was carefully described and recorded by sketches.

The chairman appointed a sub-committee of five to draw up a detailed program for the future work of the committee. Test results, comments received on Progress Report No. 2 and the report of the special committee to examine broken specimens will be used by this sub-committee as the basis of proposed program for the third stage of the work, which is that of testing variations in methods and processes which may help to improve the various types of welded rail joints.

American Association News

Executive Committee

AT A meeting of the executive committee held on July 18 aboard the yacht *Tilicum*, off Sandusky, Ohio, a number of committee reports and general policy subjects were taken up and discussed. Those present consisted of President B. I. Budd, F. R. Coates, J. N. Shannahan, W. H. Sawyer, R. P. Stevens, Harry Reid, J. H. Hanna, Cornell S. Hawley and Past-Presidents Charles L. Henry and A. W. Brady. E. P. Waller represented J. G. Barry, M. B. Lambert acted for H. D. Shute and G. C. Hecker represented Secretary J. W. Welsh, who is in Europe as a member of the committee on foreign operation.

Mr. Hanna reported the recommendations of his sub-committee on depreciation, giving an outline of the arrangements contemplated for preparing the material which will be presented for the electric railway industry. The report was discussed by members of the finance committee, and at the request of President Budd several others expressed their views on the proposed method of procedure. The recommendations of the committee were adopted.

Reports from the committees on company membership and on individual membership were presented. It was reported that the total number of individual members of all the affiliated associations now amounts to 746. Several applications for new membership were approved.

Program plans for the annual convention to be held at Atlantic City, October 6-10 were taken up by Chairman Coates, of the committee on meetings and subjects, and Mr. Hecker reported on the tentative arrangements planned by the entertainment committee of which F. H. Gale is chairman. Although the program is still subject to some slight modifications, the executive committee approved it in its present form.

A progress report from the exhibit committee on the amount of space sold for the coming convention showed a total of 65,383 sq.ft. of space sold so far this year in comparison with 55,421 sq.ft. at the corresponding time last year, an increase of approximately 18 per cent. From the rate at which requests for space are being received the committee estimates that the total space taken for this convention will exceed the record figure of 75,681 sq.ft. sold last year.

Some further discussion of the subject of exhibits took place. President Budd expressed himself in favor of encouraging operating companies as well as manufacturers to exhibit cars and other railway equipment. He said that such displays by operating companies will increase the interest and value of the exhibits and should be encouraged. New developments in car design, construction and arrangement, it was felt, should occupy an important part of the exhibit space, so as to disseminate to the industry at large the progress along these lines during the year.

Not only cars and car equipment but also any other new devices or methods developed by operating companies, as well as manufacturers, were considered valuable for exhibition. It was pointed out that many operating companies are backward about calling attention to new developments which they have made, and for this reason they should be encouraged and urged to take part in promoting the progress and development of the industry by exhibiting new methods worked out on their properties. In order to encourage the exhibition of car equipment at next year's convention, the association staff was instructed to make an investigation of available locations for the convention which will be particularly suited to the exhibition of electric cars.

Activities of the publicity committee which have been carried on since the last meeting were described by W. H. Sawyer, chairman. This included distribution of the booklet "Electric Railways Have Come Back" to practically every financial editor in the country. The committee reported that the financial pages of the daily press are reflecting a much friendlier tone toward electric railway securities than has been the case heretofore. Other recent work done by the committee has included wide distribution of the facts regarding several recent events which, it was felt, would give the public at large a better understanding of the electric railway situation. A new series of "Traction Tom" posters have been prepared, and the committee has also taken steps to advise the industry that the publicity material put out by the advertising section is designed to be used in whole or in part by the various operating companies to fit their individual requirements.

In the absence of Mr. Storrs, Mr. Brady reported for the committee on co-operation with the National Automobile Chamber of Commerce. Recommendations were made in regard to proposed revisions in the constitution of the association to allow membership of bus subsidiaries of railway companies. These recommendations were discussed and the committee was authorized to prepare certain tentative changes in the present constitution so that they may be taken up at the next meeting.

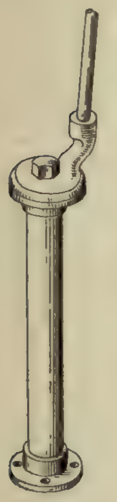
The subject of a contribution to support the work of the street and highway safety conference organized by the Department of Commerce was discussed and was referred to the finance committee. Participation in this work was urged by several of those in attendance.

There will be no further meeting of the executive committee until just prior to the annual convention. In consequence, the next meeting is scheduled to take place on Oct. 6 at Atlantic City, N. J.

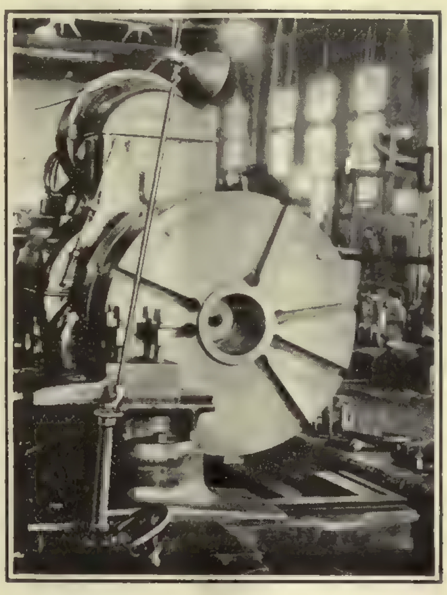
Maintenance of Equipment

Light Support Mounted on Lathe Carriage

THE most essential point to illuminate in connection with machine tool work is the cutting tool. As this moves with the carriage where work is done on a lathe, the New York Central Railroad in its Harmon shops has found a supporting bracket for a light mounted on the lathe carriage of advantage. An accompanying illustration shows this mounted on the carriage of a 42-in. engine lathe. The lower part of this consists of a stand constructed of a floor plate with 1-in. pipe upright, about 15 in. long. The top of this upright is also fitted with a floor plate and a double joint is bolted to this. One end of this double joint can rotate about the upright pipe support and the other end clamps the supporting arm of the light, which can also rotate in a vertical plane. The light can thus be arranged in any desirable location properly to illuminate the work. The upright pipe arm which supports the lamp is of ⅜-in. pipe and the receptacle with shade mounting is attached to the end of this. The bottom part of the floor plate which rests on the lathe carriage has a projecting lug which is fitted in a bracket so that it can be lifted off when the bracket is not required or when work is being installed in the lathe.



Detail of Double Joint for Light Swivel



By Mounting This Adjustable Lamp Bracket on the Lathe Carriage Work Can Be Better Illuminated

One Truck Equals Six Men

AMONG the extensive equipment found in the Cold Springs shops of the Milwaukee Electric Railway & Light Company is an electrically driven industrial truck which is used for transporting materials from one department to another. The truck used is a Model K-22 Yale, made by the Yale & Towne Manufacturing Company. This model is a self-loading transportation unit with an elevating platform. It is used to lift loaded skids from the floor, transport them to a given place and then either set them down on the floor or raise them to such a height that they may be stacked in piles or loaded upon motor trucks. Two types of skids are used, as shown in the illustrations.

The operation of this truck has been placed under the supervision of the clerk in the shops department, who has arranged the schedule for its use in such a manner that it travels on a regular route, serving the various departments of the shop at scheduled intervals. The operator of the truck punches a time card at the start and finish of each run and must account for any variation or irregularity in the running time.

This Yale Elevating Platform Truck Operates on a Regular Route and Schedule in the Shops Department of the Milwaukee Electric Railway & Light Company

Scrap Material Is Transported by Truck in Containers of This Type. Scrap Iron and Steel Are Removed by an Electromagnet in the Yard

The schedule is arranged so that the entire shop is covered five times a day, while the machine, forge, and storerooms are given four additional trips. This extra service to these departments is necessary because of the quantity of interchange of materials between these departments.

These trips, particularly the short ones, do not take up all of the operator's time, hence he is available for odd jobs during the layover periods. A careful account is kept of the operation of this truck upon a special account number, and it has been found in the period of operation that the truck has displaced six men who were formerly employed in hauling material from one department to another. It is estimated that not only will the truck pay for itself, but it will make a profit for the shops department.

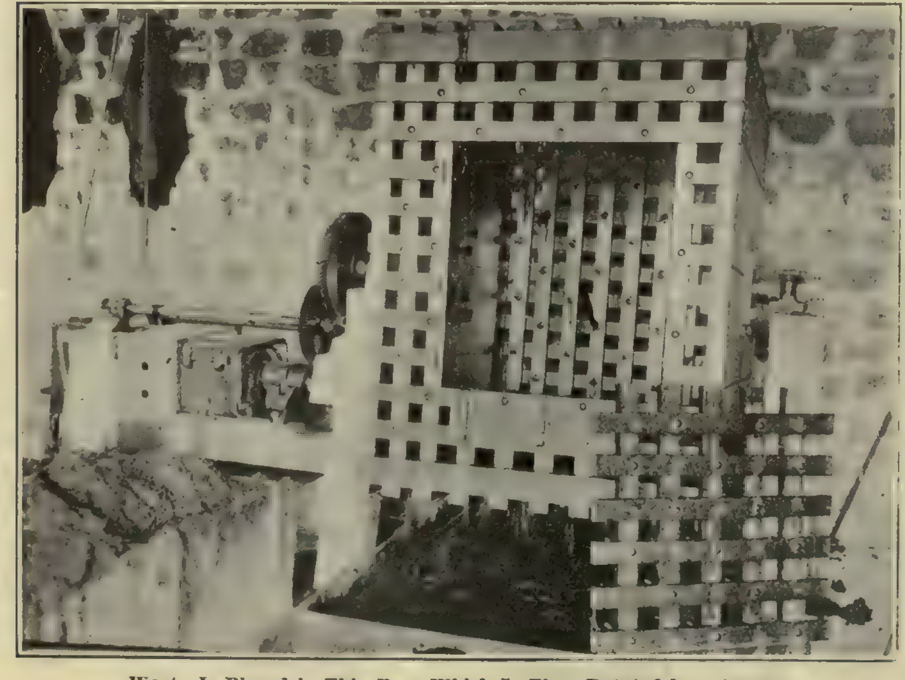
Waste Reclaiming Machine Separates Fibers

As PART of a program for reclaiming old oil and waste which is now being worked out by the Denver Tramway, the machine shown in the accompanying illustration has been built in the company's shop for reconditioning old waste after the oil has been removed and for separating short fibers that tend to pack down and reduce the resiliency of the material after it is put into an oil box.

The machine consists primarily of a box, almost cubical in shape, built of wood slats spaced far enough apart to allow loose short lengths of fiber to drop through. This is mounted on bearings so that it can be rotated by means of an old compressor motor which has been arranged for this purpose. At the front a door, also made of the same type of slats as the rest of the box, is arranged so that it can be readily taken off for charging the box and for removing the reclaimed waste.

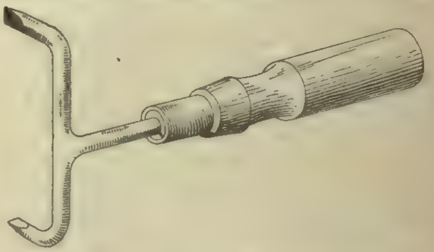
Small bolts, projecting into the interior approximately 4 in., are spaced as shown in the illustration so that the waste, as it tumbles about with the rotation of the box, impinges on them and is pulled apart. The short lengths of fiber are allowed to fall through to the pan below. The waste which remains is fluffed up and the fibers straightened out, so that from the standpoint of lubrication requirements it is reported to be practically as good as the new material.

From 50 lb. to 100 lb. of waste is put in for each charge. The box is driven through a reduction gear so that it rotates slowly. Approximately one-half hour is required for this amount of waste to be thoroughly reconditioned.


Waste Is Placed in This Box, Which Is Then Rotated by a Motor

Handy Tool for Removing Inaccessible Screws

A NOVEL type of offset screwdriver is used in the shops of the Illinois Traction System at Decatur for getting at inaccessible screw heads such as those under the insulation on circuit breaker housings and control apparatus. This tool makes it possible to remove the cover from the switch group control apparatus without entirely removing the insulation material which is fastened to the cover. One leg of the offset screwdriver is 6 in. from the other and has the blade set in one direction, while on the other leg the blade is set at right angles to this direction. Thus it is possible, by alternately using one blade and then the other, to remove a screw from an inaccessible place. The advantage of this tool over the ordinary type of leverage screwdriver is that pressure may be applied to the vertical handle at the same time that the leverage action is brought into play.


Handy Tool for Removing Inaccessible Screws

Offset screwdriver has one blade at right angles to the other, while the driver is so designed as to allow pressure to be applied vertically at the same time that a turning effect is produced by moving the other end of the offset.

Several of these screwdrivers are in use in the electrical department at the Decatur shops and have proved their worth by speeding up the work of this department.

Underground Cleaning Tanks Save Shop Space

THE arrangement of cleaning tanks used in the shops of the Department of Street Railways, city of Detroit, is of interest because they are located below the floor of the truck shop, where the parts can be readily handled by the overhead crane and where the tanks are near the point at which most of the materials are taken down for cleaning. One usual objection to a location for a tank of this kind in the truck or motor shop is that space is at a premium. For this reason such tanks are frequently located in out-of-the-way corners to save room, but making the cost of handling material to and from the tank excessive.

In the Detroit shops this problem has been overcome as shown in the accompanying illustration. The cleaning tanks are sunk into the truck shop floor and covered by substantial steel trap doors so that when the tanks are not in use the space occupied is available for other purposes. These tanks are used for cleaning both truck and motor parts and are heated by steam coils. The solution is agitated by admitting compressed air and the fumes and steam given off by the hot liquid are taken out with an exhaust blower discharging outside of the building. This eliminates the objection of steam and fumes rising in the shop.

Caustic soda is used as a cleaning material. One tank of the two shown contains the cleaning solution. The second tank contains only hot water for rinsing.

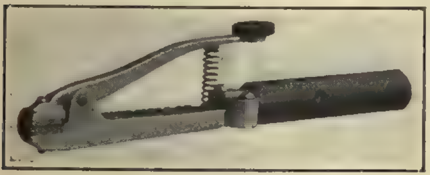
The parts are handled in substantial steel baskets. They are dipped into the first tank and allowed to remain for about fifteen minutes and are then removed by means of the overhead crane and dipped into the rinsing tank to wash off the solution thoroughly. When removed from the second tank the parts are transported directly in the baskets to any part of the shop where they may have been removed from trucks or motors. In the event of welding or other repairs being necessary, the parts are transported directly to the points where this work is done. Thus the entire operation is carried out with a minimum amount of handling.

Valuable Space Is Saved in Detroit Shops by Having Cleaning Tanks Underground

New Equipment Available

Welding Electrode Holder

WITH the object of overcoming heating of the handle, a new type of welding electrode holder has been developed by the Gibb Instrument Company, Bay City, Mich. This holder has heavy aluminum members of high conductivity and an air-cooled fiber handle arranged so that free circulation of air through it will be obtained. The heating of the electrode holder, which is due to the cable connection and is ordinarily a source of trouble, has been eliminated in the new design by the use of outside connections. The light weight obtained with the aluminum castings results in a holder that weighs but 15 oz. and in use does not readily tire the operator. In practice electrode wires are sometimes used up to short lengths and in drawing an arc on the holder the wire may slip and the jaws get burned. The welding electrode holder now developed has removable copper jaws. By depressing the spring under the fiber thumb piece, the copper jaws can be quickly changed when worn out.



Light-Weight Electrode Holder Which Does Not Heat

Danger of Transformer Explosion Eliminated

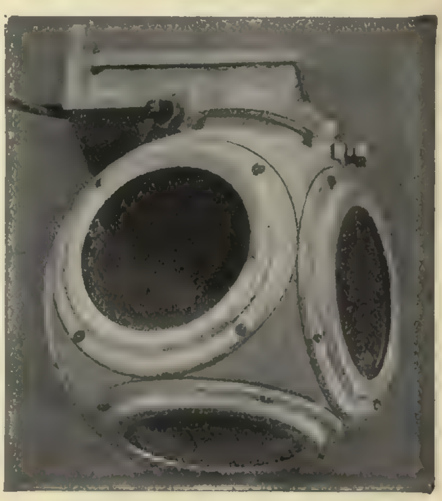
A NEW transformer which eliminates danger from explosions has been developed by the Westinghouse Electric & Manufacturing Company. It has a cushion of nitrogen above the oil surface in place of the air that usually occupies this space. This prevents oxidation of the oil and the risk of fire or explosion of inflammable gas above the oil surface is eliminated.

The oil expands and contracts according to temperature and this expanding and contracting cause what is known as "breathing." When the oil expands it forces some air out, and similarly when the oil contracts, air is drawn in. The air being drawn into the transformer passes through a quantity of deoxygenating and dehydrating chemicals, so that dry nitrogen enters the gas space.

It is possible that some fault under the oil level may result in an explosion of liberated gases, formed when an electric arc causes a breakdown in the oil composition. To prevent them the new transformer has a relief device resting upon the manhole opening in the top of the transformer case. It consists of a diaphragm of thin sheet micarta clamped to a support directly beneath the manhole cover, which rests upon the gasketed surface of the diaphragm support and is free to move upwardly except for its weight and the retarding action of a number of heavy springs. The diaphragm is clamped in position with a ring and a gasket, forming under normal conditions a seal which is gas and oil tight. Thus, if an explosion occurred, the pressure would first rupture the diaphragm and then force the manhole cover open far enough to permit the pressure to be relieved. Then the springs would bring the cover back to its original position quickly, closing the opening. The operation does not permit the discharge of oil or the diffusion of air into the case.

Five-Way Signal Light

A NEW light-weight signal lamp with five lens apertures which allow a variety of directional combinations has just been placed on the market by the Nichols-Lintern Company, Cleveland, Ohio. It is designed to focus a 25 or 40-watt straight filament lamp, but a 50-watt mill type concentrated filament lamp can be used with an extension socket. The lamp socket is fastened to the supporting bracket, so that it is not necessary to remove the lens in order to get at the lamp.



Signal Lamp with Five Lenses

A strong body is provided for the lantern, which fastens to the supporting bracket by set screws. The body can thus be dropped for making replacement. Each lens is fastened with a ring cushioned on a rubber gasket. The body is of cast aluminum and has a weight complete of 6 lb.

The News of the Industry

Municipal Plan Likely

Chicago Mayor Said to Have New Plan Ahead If Present Railway Purchase Negotiations Fail

Mayor William E. Dever has an alternative plan worked out in detail for the city of Chicago's traction needs in the event that all purchase negotiations with the Chicago Surface Lines fail. Whether it means competing lines, a subway built by special assessment or bus lines the Mayor declined to say. His only remark was that he hoped to be able to make a definite public announcement at the next conference as to agreement or disagreement on the price to be paid by the city.

DISAGREE OVER VALUE OF LINES

Thus far there has been no indication that the bankers or the Surface Lines officials have given one inch in their valuation of the lines at $162,000,000. This price the Mayor contends is too high, and he believes it would be rejected by a large majority at the polls. The Mayor would not comment upon the probabilities of a successful appeal to the courts by the lines and the likelihood that the cars would run under the protection of the courts, without reference to whether the city granted or renewed a franchise.

The city and the officials of the Chicago Rapid Transit Company are also at odds in regard to the worth of the lines, the Mayor admitted this week, in the renewed conferences with Samuel Insull, head of the lines, and Patrick J. Lucey, attorney. The Mayor announced that he had invited Mr. Insull to put his ideas about the valuation of the lines into writing.

LEGALITY OF DEAL QUESTIONED

Whether the city has a right to go into the railroad business outside of its own boundaries was a new question that arose recently in the conference with the officials of the Chicago Rapid Transit Company, operating the elevated lines. A few of the car tracks of the Surface Lines are likewise outside of the city limits, but the question is particularly pertinent because so large a percentage of the elevated tracks are not within the boundaries of Chicago. At present the "L" lines extend through Evanston and Wilmette and the Oak Park "L" and the Douglas Park "L" will, when completed, extend into Forest Park and Oak Park.

The new question which arose necessitated the presence of Corporation Counsel Busch in the conferences. He admitted that at the present time he was not able to give an opinion as to the legality of the city obtaining control of the lines outside of the city. Without these outside traction properties being entirely unified with those within the city, it is difficult to see how either could be operated, and for rate-making purposes the Illinois Commerce Commission placed a valuation of $86,500,000 on the entire system.

Five-Cent Fare Extended by Public Service Railway

The Public Service Railway, Newark, N. J., has filed with the Board of Public Utility Commissioners of New Jersey a tariff rezoning its lines in its central division. The step is voluntary and unless the tariff is suspended by the board, it will give New Brunswick, Perth Amboy, Rahway, Bound Brook, Somerville, Raritan and other municipalities in central New Jersey the same 5-cent fare within their limits as is now in effect in many other cities served by the company.

No transfers will be issued and zones have been shortened, so that on four of the company's principal lines twenty 5-cent zones will take the place of sixteen former 8-cent zones. The company's action follows the request of several of the larger municipalities that the 5-cent fare plan be extended.

"Jolla"fication Edition in Honor of San Diego Extensions

The San Diego Electric Railway and the San Diego *Union* and San Diego *Tribune* made July 1 a red letter day to the San Diego rider and reader by co-operating to issue what is probably the most elaborate transportation edition ever got out by a daily newspaper. The occasion was the opening of the 14-mile high-speed line to Ocean Beach, Mission Beach and La Jolla promptly on the day promised. The project involves some $3,500,000 in all-around extensions and improvements.

Each paper used color plates on two or more pages of a series of sections totaling thirty-two pages with lapovers of traffic material even in the regular news sections. In this record-breaking space the story of the new work and its meaning for a Greater San Diego were told with due emphasis and ability. Scores of pictures showed the map of the new route and its relation to the rest of the system, the catenary construction, the pantograph cars and the various features of the car equipment. A feature was the series of articles from manufacturers of the different items entering into the job, supplemented by the story of how the work was carried out entirely by the company's staff. There were also articles on San Diego railroading in older days and much other matter to give the San Diego car and bus rider a real inside view of the aspirations of the men who serve their traffic needs.

Main Points Settled

Two Issues Still Being Contended by City and Cincinnati Properties—Drafting Franchise Under Way

Several minor points in the proposed settlement of the differences between the city of Cincinnati and the Cincinnati Traction Company and Cincinnati Street Railway remain to be adjusted, but the main issues involved are agreed upon. It is understood that the Cincinnati Street Railway will take back the property from the Cincinnati Traction Company, to which it leased it in 1901 for a period of forty-five years. Work of drafting the proposed franchise has been started.

The existing capital of the traction company, $36,166,050, is to be reduced to $27,230,378 in the event the agreement goes through and the street railway is restored to active operation of the system. Of the existing capital $27,230,950 represents permanent capital and $8,927,100 reducible debt. Under the terms of the proposed franchise the permanent capital will be reduced to $22,761,050, while the reducible debt will be brought down to $4,468,428. The street railway also agrees to expend $1,750,000 prior to 1928.

The agreement also provides for a 7½-cent minimum rate of fare for a period of three years with free transfers as at present. The present rate of fare is 9½ cents.

The two points that still remain unsettled relate to the powers of the Director of Street Railroads and to the repairing of streets between the rails. The street railway has agreed to contribute $15,000 annually toward the maintenance of the Department of Street Railroads. W. Kesley Schoepf, president of the Cincinnati Traction Company, objects to what he has designated the arbitrary powers that would be given to the director and insists that the railway be protected against caprice by the director, so that he could not insist that the company comply with unreasonable demands.

The other objection raised has to do with the interpretation of repairs of streets. Mr. Schoepf insists that the operating company should not be expected to pay for the rejuvenation of the existing "worn-out streets." Under the existing ordinance the operating company is expected to pay only for street restoration. That is, when the traction company is compelled to remove paving to repair its tracks, the paving disturbed must be replaced. The directors of the traction company are in accord with the principle that they assume 50 per cent of the cost of street repairs after the streets traversed by their lines have been rebuilt, but they insist the car rider should not be expected to assume any of the cost of replacing the existing pavements.

Bus Feeders Proposed for New York Rapid Transit Lines

The Brooklyn-Manhattan Transit Corporation on July 23 announced that it was ready to undertake bus operation as supplemental to its subway, elevated and surface service in Brooklyn. In fact G. M. Dahl, chairman of the board of directors, stated that the company had already negotiated for the purchase of ten double-deck buses, to be delivered in two weeks.

The corporation as yet has made no application for franchises for bus routes, but such applications will probably be made as soon as plans can be completed, on the most-needed lines. The rate of fare to be charged and the use of transfers will be matters of individual discussion with reference to particular routes. Until specific bus routes are authorized the B.-M. T. plans to use the new vehicles for carrying picnics and for special trips. Mr. Dahl said:

> We have purchased these buses in order that the public, as well as public authorities, if they deem it wise to authorize us to operate bus lines, may understand that we are in earnest in our desire to render the broadest possible service. Various sections have developed very rapidly in the last few years.
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> Construction of rapid transit lines into such sections is practically impossible. Such lines would be extensions of existing trunk lines which are already overburdened. Logically any rapid transit construction should be important trunk connections, such as Fourteenth Street and Nassau, so as to allow fuller use in rush hours of existing facilities. Even as to surface railroads, further extensions will take time and need to be carefully considered. The conclusion is inevitable, therefore, that buses should play an important part, in a large system, in extending transportation into growing sections.
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> It should not be overlooked that houses can be erected and occupied within a year and a new section thus largely populated without adequate transportation. The construction of rapid transit lines is a slow process, taking a good many years from the laying out of a route to the beginning of operation. This company desires to do its part toward securing immediate transit for such sections and thus indirectly encouraging further development of outlying sections.
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> Bus operation seems the logical and immediate method of furnishing such service. If a transit line is later constructed through a section where buses are operated, the buses can be shifted to another section without loss of capital.

Ticket Rate Increased in Toledo

An increase in fare has been announced by B. C. Adams, president of the Community Traction Company, Toledo, effective on Aug. 3. At that time the cash rate will be 8 cents as at present, but the ticket rate will go to seven for 55 cents. The next jump will be to a straight 8-cent fare.

At the time of the report of operations covering June there was a balance in the stabilizing fund of only $3,475 and it is estimated that the balance has now been wiped out and that the fund is in the red.

The report of Acting Street Railway Commissioner E. L. Graumlich shows a net deficit of $38,497 for June chargeable to the stabilizing fund. Compared with June last year savings of $24,630, due largely to cut in schedules, were shown. It was estimated that one-man cars on the Bancroft line resulted in a cut of $2,000. Feeder bus lines continued to show a loss. A new line was established in connection with the Long Belt serving a territory on Monroe and Central Avenues. In June 4,127,773 revenue passengers were carried, or an average of 137,592 daily. The average for May was 148,708 and for February 182,092.

There is now $180,105 cash in the sinking fund and bonds aggregating $596,000 have been retired.

Suggestions have been made by city authorities that a special election be called to vote upon a proposal to eliminate the sinking fund provision of the Milner ordinance and turn back some $700,000 into the stabilizing, depreciation and maintenance funds. Such a change would have to be approved by the Henry L. Doherty interests.

Abandonment of the Indiana and St. Clair Street tracks with extension of the use of one-man cars is contemplated in the economy program favored by both company and commissioner.

The Common Pleas Court of Lucas County has ruled in favor of the Toledo Edison Company, on its demurrer to the suit filed against it by the city for $200,000 excess power charges paid by the traction company in the last two years. The case will be appealed. The Council may be asked to ratify a power rate of 1.4 cents per kilowatt-hour in place of the 1.7-cent rate now in effect but not being paid due to disapproval by the commissioner.

Buses—Talk of the Hour in Kansas City

Agitation looking toward the installation of buses on the streets of Kansas City, Mo., is becoming louder every day, with the newspapers devoting much space to the subject. A recent editorial in the Kansas City *Star*, entitled "Motor Bus vs. Trolley," calls attention to the advantages which would result from auxiliary bus service under the management of the Kansas City Railways. But it states that if the receivers for the company are not prepared to undertake the project, then some other organization should be permitted to do so.

Answering the suggestion in the *Star's* editorial, Receiver Wilson of the railway said he never had opposed the use of buses as feeders to the railway service. He explained that the company was under the control of the United States court and that the receivers had no jurisdiction. It was his belief that in the plan for reorganization that would follow the termination of the receivership full consideration should be given to bus operation in connection with street railways.

The prospects for the operation of well-organized bus service in Kansas City were referred to in the ELECTRIC RAILWAY JOURNAL of July 5 following the filing of an application for incorporation of the Kansas City Motor Coach Company.

A representative of the Yellow Coach Manufacturing Company on July 22 submitted to the Mayor a survey for the establishment of a bus system in the city. The Mayor said that any such action should start in the Council.

P.R.T. Applies for Eight-Cent Fare

An increase from the present fare of 7 cents with a 6½-cent ticket rate to an 8 cent cash fare with a 7½ cent ticket fare is sought by the Philadelphia Rapid Transit Company, Philadelphia, Pa., in a new tariff filed with the commission on July 21. The petition states that the reasons for the increase are to enable the company to finance the purchase of 200 new cars, costing about $2,600,000, to replace as many old ones still in service, and to make possible the payment this year of the co-operative wage dividend due the men amounting to about $1,800,000. In return for this grant the company promises free transfers at all junction points where a 3-cent exchange is now needed, except in the central delivery loop—between the two rivers from Pine to Callowhill Street.

INCOME ACCOUNT OF THE PHILADELPHIA RAPID TRANSIT COMPANY

	Six Months to June 30 1924	1923
Operating revenue.......	$22,596,715	$22,512,399
Operation and taxes.....	16,317,866	16,448,461
Operating income......	$6,278,849	$6,063,938
Non-operating income....	260,329	268,374
Gross income.........	$6,539,178	$6,332,312
Fixed charges...........	5,201,017	4,996,431
Net income...........	$1,338,161	$1,335,881

The company has made public a letter sent to Mayor Kendrick and Charles B. Hall, president of the City Council by Thomas E. Mitten, chairman of the executive committee of the company's board of directors. In the communication Mr. Mitten called attention to the fact that the operating income this year probably would be about $2,000,000 less than was expected and further that the increase in the operating revenue for this year would be less than the normal yearly increase in the operating revenue. A comparative statement showing the company's income account and passengers statistics for the first six months of 1923 and 1924 follows:

PASSENGER STATISTICS OF THE PHILADELPHIA RAPID TRANSIT COMPANY

	Passengers Carried 1924	1923	Average Rate per Passenger 1924	1923	Passenger Revenue 1924	1923
January..........................	78,297,258	74,857,899	4.79c	4.84c	$3,748,595	$3,625,767
February..........................	73,247,920	68,570,408	4.78c	4.82c	3,501,989	3,305,182
March..........................	79,591,970	79,422,257	4.78c	4.82c	3,802,197	3,827,671
April..........................	78,235,652	76,730,494	4.78c	4.81c	3,743,361	3,694,068
May..........................	81,288,979	82,591,742	4.77c	4.81c	3,880,553	3,973,888
June..........................	75,366,347	77,264,587	4.77c	4.82c	3,591,596	3,723,608
Six months....................	466,028,126	459,437,387	4.78c	4.82c	$22,268,294	$22,150,187

The company explained the situation:

> Operating revenue for 1924 is short the usual normal increase over 1923 and now bids fair to be more than $2,000,000 less for the year than was anticipated. Men and management have co-operated in making every possible economy, and while there is no doubt that the P. R. T. 6 per cent dividend will be fully earned, a large part of the men's co-operative wage dividend this year must depend upon an increased fare, for which a formal application must now be made.

Injunction Against Baltimore Fare Increase Denied

A permanent injunction restraining the United Railways & Electric Company, Baltimore, from charging a 7½-cent fare was refused the Mayor and City Council of Baltimore by Judge Charles F. Stein in City Court on July 19. The increase in fare was granted by the Maryland Public Service Commission. It became effective on June 1. On May 30 the court refused a temporary injunction and on June 10 heard the application for a permanent injunction.

It was claimed by the city that the increase was unlawful, unreasonable and unjust and that an increase could not be granted without a valuation of the company's property and unless an emergency existed.

In refusing the permanent injunction the court went into all the evidence brought out at the hearing before the commission and found the order of the commission "not unlawful, unreasonable nor unjust, but supported by 'clear and satisfactory evidence.'"

The city officials do not plan to take the case to the Court of Appeals. It was pointed out by City Solicitor Phillip B. Perlman, who acted for the city, that the valuation of the company's property, which was one of the things sought, is nearing completion and an appeal would mean that the case probably would not be finally acted upon before next spring. The increase granted the company is to be in effect until June 1, 1925.

Selma to Have Trackless Car System

Work on installing an up-to-date trackless car system will be commenced within a short time by the Selma Street Railway, Selma, Ala., following permission recently granted by the Selma City Council for the change to a trackless service. According to Hugh Mallory, by this change the railway will not give up any of its franchises.

Two trackless cars will be put into operation to commence with and others will be added to the service later on. It is stated by the company that the fare per passenger will be 10 cents or perhaps less. Each coach will accommodate about twenty persons.

"S. O. S." Week in Chicago Has Encouraging Results

The first week of Chicago's organized fight for safety in the streets—a campaign conducted by the Mayor's safety committee with the slogan "Safety or Sorrow"—has ended with only twelve deaths in the county, as opposed to twenty-two the week previous. The safety drive started with the co-operation of 100 boy scouts who painted the mystic initials "S.O.S." on 5,000 different sidewalk corners. It culminated in the arrest of more than 1,800 motorists in one period of twenty-four hours for various infractions of the newly authorized speed laws.

The Chicago Surface Lines is intent upon doing its share of aiding in safety by the elimination of the left-hand turns. The order of the Illinois Commerce Commission, agreed upon by Surface Lines officials, was embodied in an ordinance recently introduced at the last meeting of the City Council. This ordinance also provides for the extensive rerouting of street cars.

The drive of the city for safer streets has also led to the discussion of a real jay-walker ordinance which would prevent the pedestrian from crossing the street against the direction of traffic. Chief Collins believes that the arrest of a few such offenders would do just as much toward safety as putting the entire burden upon the motorists and the street car motormen.

An ordinance was passed by the park board prohibiting motor buses from passing each other. The park board was convinced that the practice endangered traffic too much, for the ordinary street is nearly monopolized when two buses are traveling alongside of each other. The Illinois Automobile Club strongly supported the ordinance and urged other agencies to pass a similar one. It is its contention that in order for one bus to pass another, it must swing squarely into the center of the street, thereby endangering traffic coming in the opposite direction. Similar action has already been taken by the Lincoln Park commissioners and the ordinance is also being considered by the South Park board.

Competitive Bus Permit Denied

California Railroad Commission Rules No Necessity to Grant Certificate to Pacific Auto Stages—Railway Traffic Declining—Residents Protest Bus Proposal

ANOTHER electric railway has been sustained in its protest against bus operation paralleling its line. This is the San Francisco, Napa & Calistoga Railway, Napa, Cal. A decision of the State Railroad Commission denied authorization to the Pacific Auto Stages, Inc., to operate passenger stages between the town of Calistoga and the city of San Francisco, which as proposed would have paralleled the railway's line between Calistoga, its northern terminal, and Napa, a distance of 28 miles.

The railway company has been involved since the early part of the year in protesting the application of this company. Representative municipal and political subdivision bodies together with promotion organizations generally joined with the company in protesting bus operation in this vicinity.

The Pacific Auto Stages applied for a certificate of public convenience and necessity to operate passenger auto stage service between San Francisco, Napa, Calistoga and intermediate points by way of Sausalito and the Golden Gate ferry, but it did not desire to operate any local service between any two points intermediate between San Francisco and Napa.

"MORE THE MERRIER" POLICY ADVOCATED

Some of the testimony at the hearing suggested a disposition to favor additional competitive operation on the principle of "the more, the merrier," but several of the applicant's witnesses testified that they would not be in favor of the proposed operation by the applicant if this operation would endanger the efficiency, continuity and maintenance on its present schedule of the operations of the electric line, which was regarded by all the witnesses as the main transportation facility and asset of the Napa Valley.

Some of the protesting witnesses showed a sentimental attitude on the part of valley residents against bus transportation. The principal weight of the testimony was directed in support of the adequacy of the existing service provided by the San Francisco, Napa & Calistoga Railway, and as indicative of their concern lest the operation, if allowed, divert such an amount of traffic from the railway that either the continued operation of the railway might be jeopardized or that the present number of scheduled trains in operation daily might be materially reduced. It was pointed out in support of this latter contention that it was by order of the commission that passenger train service of the Southern Pacific Company was reduced in August, 1921, to one train each way per day, since it was shown that additional operation theretofore had been conducted at a serious loss to the carrier.

The principal point of issue related first to the applicant's claim that its proposed operation would provide a considerable saving of time in transportation between Napa Valley points and San Francisco and then to the railway's contention that the proposed operation by the applicant, if authorized by the commission, would seriously damage and possibly jeopardize the value and efficiency of the railway's services to Napa Valley communities, which relied chiefly upon the railway's services and facilities for the transportation of passengers and freight.

The commission stated that from the evidence in the proceeding the applicant had not sustained its claim that public convenience and necessity required its operation, from the standpoint of providing an additional convenience and a considerable saving in time in transportation to and from Napa Valley points from and to San Francisco. The commission then ruled as follows:

> While the commission recognizes that transportation by auto stages has proved to be a matter of public convenience and necessity in many parts of the state the weight of the testimony offered on behalf of the protesting carrier indicated that a reduction of time schedules would imperil the financial standing of the railway and destroy its ability to maintain its services, which are vital to the community.

C. E. Brown, vice-president and general manager of the San Francisco, Napa & Calistoga Railway, filed exhibits which covered a period of five years to show that 690,732 passengers were carried in 1919 and 397,734 in 1923; that the balance realized in 1919 was $32,952 and in 1923 was $6,850, even though the total expenses had decreased from $271,690 in 1919 to $251,556 in 1923. It was stated that the railway had never paid any dividends, but that it had met all of its interest obligations.

Counsel for the applicant contended that undue weight might be attached to the significance of the railway's declining figures as to earnings and passengers carried in view of the fact that during certain years of that period the abnormal proportion of the traffic was due to Mare Island naval operations.

In conclusion the commission said that with the strong protests from the substantial interests, business and agricultural, of the Napa communities against the proposed operations and against any proposed new transportation which would tend to divert traffic from the railway in its present struggling financial condition and with the evidence tending to show that the applicant's claim to be able to provide a substantial saving in operating time was not well founded, and further, that the applicant's time schedules would not provide for the traveling public the convenience that is now provided by the time schedules of the railway, it did not appear that the Pacific Auto Stages, Inc., had sustained its argument that public convenience and necessity required its operation. The commission therefore rejected the petition.

New Law May Kill Jitneys in New York

That every "jitney" operator is automatically driven out of business in New York State under the provisions of the state-wide taxicab bonding law, which went into effect July 1, seems likely. This will end a long drawn out controversy between traction companies and unlicensed competitors.

Under the provisions of the new law every person operating a motor vehicle carrying passengers for hire, except a corporation under the provisions of the public service commission law or the transportation corporation law, must file an indemnity bond or insurance policy with the Motor Vehicle Bureau in form approved by the Tax Commission, and the motor vehicle bureau has no authority to issue licenses to jitneys. The driver of the passenger carrying vehicle unless he has the bond or insurance policy will be subject to arrest, fine and imprisonment.

Very few companies doing business in New York State will write insurance or bonds upon jitney operators, and while there are a number of non-admitted companies which do take this class of risks, under a special form of contract, it is stated by the Tax Commission that the bond or insurance policy of a non-admitted company will not be accepted.

Carhouse in Grand Rapids Burned

Fifty-eight Cars Destroyed in a Fire Which Wiped Out Hall Street Plant

Fire on Saturday morning, July 19, wiped out the Hall Street carhouse of the Grand Rapids Railway, Grand Rapids, Mich., together with 58 cars, most of them used in daily service. The loss is estimated at between $400,000 and $500,000 by Louis J. DeLamarter, vice-president and general manager. The company will probably buy thirty one-man, two-man cars at once and hopes to get delivery within from two to three months after the order for the new equipment has been placed. At present the company has 95 cars of its own ready for service, and with eight buses, six of the 25-passenger type and two of the 15-passenger type, and 12 cars borrowed from Saginaw and 3 from Muskegon, it is maintaining regular schedules.

Old 340, the Last of 58 Cars to Be Recognized, the Only One Which Bore Any Resemblance to the Thing Its Maker Had Intended It Should Be

The fire broke out at about 3:30 a.m. By the morning rush hour Mr. DeLamarter and John C. Madigan, traffic superintendent, had established ten-minute service instead of the regular eight-minute service on all principal lines and drivers were obtained for the buses, which had not been in active service for some time. Peak morning service in Grand Rapids requires 102 cars and peak evening 105. By Monday, by using the borrowed cars, the rush hours were efficiently served. The morning of the fire cars in the paint and repair shops, adjacent to the burned carhouse but protected by a fire wall, were put back on the trucks and sent into service. Motor trucks were used to haul these cars to points on the system where the power lines were still in service. By 9 o'clock signs on Division Avenue cars, which pass near the scene of the fire, read: "This Car to the Fire."

For the purposes of narrative the Hall Street carhouse, the largest of the three, faced Hall Street to the south. At the east the building stretched north from Hall Street along Sheldon Avenue about 234 ft. At Hall Street and Sheldon Avenue were the offices, then came the storage yards and at the west side of the building, which was about 139 ft. wide, were the paint and repair shops, protected from the carhouse proper by a fire wall behind which firemen kept the flames and saved the company's valuable repair machinery. In the repair department were stored nine 65-passenger steel cars and two other cars which were dragged to safety.

The Hall Street carhouse was constructed in 1902. Mr. DeLamarter said he did not believe the building would be replaced. Resort will probably be made to storage in the open. Mr. DeLamarter said the loss was fully covered by insurance. It is expected the exact total loss will be determined by adjusters very soon.

Mass of Bricks from the East Wall Which Collapsed, Killing One Fireman and Injuring Another

View of Carhouse as a Huge Section Was Falling. Walls Standing Were Later Torn Down, as Was the Stack

Attempt to Prevent Elimination of Jitney Competition in Akron

Common Pleas Judge L. S. Pardee at Akron, Ohio, has granted a temporary injunction restraining Mayor D. C. Rybolt, Safety Director Carter and other city employees from rerouting jitneys under the terms of a temporary street railway franchise passed by the City Council of Akron on Feb. 25 of this year. The injunction is an attempt to prevent the city from eliminating all jitney and bus competition along the route of the railway lines of the Northern Ohio Traction & Light Company.

Readers of the ELECTRIC RAILWAY JOURNAL will recall that one of the conditions upon which railway service was resumed in Akron last February after a period of suspension of twenty-seven days was that the city would eliminate jitney competition along the street railway and bus lines of the traction company.

Jitney Service Purchased

Buses and service which have been conducted by Yuill & Stiles the past nine years have been purchased by the York Utilities Company, Sanford, Me. The buses will be operated in conjunction with the electric line. The new service will connect with the electric railway.

Judge Sustains Seattle's Suit for Tax Complaint Dismissal

When Judge Jeremiah Neterer of the federal court in Seattle, Wash., recently sustained the city of Seattle's motion for dismissal of the amended and supplemental complaint in suit filed by the Puget Sound Power & Light Company, pending since June 1, the power company lost another skirmish in its battle with the city of Seattle to collect its share of the Seattle Municipal Railway tax for 1919, recently paid to King County.

The power company, under protest, recently paid the tax in full to King County. The company immediately brought action in equity in the United States District Court, in which it attempted to force the city to pay three-fourths of the tax, under an agreement entered into at the time the city purchased the railway from the plaintiff. In a later supplemental complaint, the power company asked subrogation for any liens that the state might have had against the railway property, if the taxes had not been paid. The city entered a motion for dismissal, which the court sustained.

Judge Neterer held, in his decision, that the special railway fund is not liable for the taxes sought. He held also that the tax collectors were within their rights in collecting the tax from the power company, and that the latter still has a right to bring legal action for the tax share.

"Good conscience," said the decision, "does not seem to me, under the circumstances, to dictate subrogation, nor has the court the power so to decree. If the plaintiff so elects, the cause may be transferred to the law side for further proceedings."

Counsel representing the city, state and school district will not map out their plan for action to back up demands for shares of the interest of the delinquent 1919 railway tax until after the next telephone rate case hearing is held, Corporation Counsel T. J. L. Kennedy states. The city has made a demand for its share of $113,725; the school board has filed a formal demand for its share of $48,000, and the state is asking for approximately $34,000.

Action on Buffalo Bus Proposal Again Postponed

Once again the City Council of Buffalo, N. Y., has put off definite action on the applications of the International Bus Corporation, a subsidiary of the International Railway, and the VanDyke Motor Bus Company, Inc., to operate a fleet of double-deck passenger buses in Buffalo at a 10-cent fare. Objections raised by Frank C. Perkins, the Socialist member of the Council of five, forced the adjournment. He has been advocating municipal bus lines.

Melville L. VanDyke, president of the VanDyke Motor Bus Company, which operates a taxi service in Buffalo and the VanDyke International Tours, Inc., between Buffalo and Niagara Falls via the Canadian Boulevard, said his company was ready to invest upward of $1,500,000 in the system and have a fleet of buses in operation within thirty days.

James L. Carpales, speaking for the VanDyke company, informed the City Council that in Detroit, where he managed bus lines, a 10-cent fare is charged and the cost of operation is 9.21 cents for every 10-cent fare. Commissioner Perkins called attention to the fact that only 5 cents was being charged on the New York City trackless lines on Staten Island, but Mr. Carpales said they were losing money.

Sentiment favors the VanDyke company because the International Bus Corporation asks to operate only two lines—Delaware Avenue and East and West Delevan Avenue. The International proposes a 3-cent charge for transfers from buses to connecting car lines and 7-cent transfers from car lines to buses. This would equalize the fare if passengers used buses and cars.

More Buses Purchased by Public Service Railway

Announcement has been made that the Public Service Transportation Company has purchased all of the capital stock of the Gray Bus Lines, Inc., which operates on two lines in Elizabeth, N. J., and on six in Middlesex County as follows:

Elizabeth—Aldene, operating from Bayway to Aldene, five buses.

First Street, operating in Elizabeth, four buses.

New Brunswick—South Amboy, operating through South River and Sayerville, nine buses.

New Brunswick—Perth Amboy, operating over the Lincoln Highway by way of Metuchen, three buses.

Metuchen—Plainfield, two buses.

New Brunswick—Highland Park, two buses.

Lincoln Gardens, operating from Pennsylvania Railroad station in New Brunswick to Lincoln Gardens, two buses.

Livingston Avenue, operating in New Brunswick, three buses.

M. R. Boylan, vice-president and general manager of the Public Service Company, said that the purchase of the Gray Bus Lines was made in accordance with the company's plan of co-ordination of bus and trolley service. It is proposed to combine the operation of these buses with the operation of cars of the Public Service Railway in such a way as to give the traveling public an improved service. He said:

> Our policy is to maintain bus equipment in a high state of efficiency and to substitute the best, most comfortable and latest type of bus for those now in operation as fast as it is economically possible to do so.

Audit Company Believes Fare Increase in Springfield Necessary

At the instigation of the Springfield Chamber of Commerce and with the consent and co-operation of the Springfield Street Railway, Springfield, Mass., the New England Audit Company has conducted an investigation into the affairs of the railway for the purpose of getting light on the justice of its proposal to increase passenger fares from 7 cents to 10 cents cash or 8⅓ cents on the ticket basis, within the primary zone, with corresponding increases for other zones. The move to increase rates followed the arbitration award in favor of a wage increase, and an eight-hour day for the trainmen. The report as submitted to the committee of the Chamber of Commerce sustains in all essentials the position of the railway. The audit company sums up its findings as follows:

> In a word it may be said that the Springfield Street Railway does not suffer by reason of entangling alliances, that it is not overcapitalized, that it has not recently paid excessive dividends (if, indeed, its dividends may be regarded as reasonably sufficient under present conditions), that the management is honestly endeavoring to give the public as good service as circumstances permit; that its overhead expenses are not excessive; that its operating profits have been small; that its present financial condition is not remarkably good; that its expenditures for upkeep of roadway and equipment are above the average; that its operating costs are above and its profits below the average, and that its large operating expenses are not due to mismanagement, but primarily to the high cost of labor, which is a matter beyond the control of the management.
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> It may be said, also, that if the present quality of service is to be continued a substantial increase in revenue is necessary.

Accompanying the report were diagrams showing how each dollar of revenue was actually distributed by the car company in 1923 and how each dollar will be distributed, according to the estimate of the audit company, if the proposed fare increase becomes effective. The comparison is as follows:

	1923, Cents	Proposed, Cents
Labor	51	54.9
Power, material, paving and other operating costs	28.2	25.8
Dividends	6.8	6.2
Interest	5.7	5.3
Salaries	3.5	3.2
Taxes	3.2	3.0
Surplus	0.8	0.9
Miscellaneous	0.8	0.7

Passenger traffic on the Springfield Street Railway system has declined steadily since April last, according to Herbert M. Flanders, general manager. He says that at the present time passenger traffic averages 12½ per cent lighter than a year ago.

Civic clubs of Springfield opposed to the projected fare increase have appointed a joint committee to investigate the fare proposal in the light of the statement submitted by the New England Audit Company. As a first move the committee requests that any hearing conducted by the Public Utilities Commission on the question be held in Springfield.

Interurban Rates Out of Akron Increased

The Northern Ohio Traction & Light Company, Akron, Ohio, has filed with the Public Utility Commission a new schedule of rates on its entire interurban system, to become effective on Aug. 10.

The new schedule makes no change in fares between Akron and Cleveland and Akron and Canton. Fares on practically all other points on the company's lines are raised from 5 to 40 cents. The average rate of fare now in effect on the interurban system is 2.2 cents per mile. The new schedule provides an average fare of 2.6 cents.

Rate increases from Akron to the following points are:

	Cents		Cents
Bedford	5	Massillon	10
Brady Lake	15	E. Greenville	5
Ravenna	15	Navarre	10
Wayland	25	Beach City	25
Newton Falls	20	Strasburg	25
Warren	10	Dover	35
Atwater	20	New Phila.	35
Limaville	15	Midvale	40
Alliance	15	Uhrichsville	40

A new schedule of rates has been filed by the Cleveland-Akron Bus Company and the Northern Transit Company, increasing bus rates between Akron and Cleveland from $1 to $1.40 one way. These rates become effective on Aug. 15.

Another Celebration Sale Helps Railway

During the early part of July a large department store in Galveston, the Clark W. Thompson Company, conducted a sale in celebration of its fourth anniversary. Working along the theory that a large group of prospective customers waiting outside of the store, before the doors were opened to the public, would give the sale an impetus which the management considered necessary for its success, an arrangement was made with the Galveston Electric Company to transport all passengers, between 9 and 11 o'clock of the first morning, free of charge. Car registers were read at the beginning and closing of the period and all passengers hauled were paid for by the department store.

For several days prior to the sale the department store and railway displayed advertisements in the local papers announcing the free ride feature. Cards were distributed by the trainmen to all passengers boarding. On one side was printed:

> Good Morning! No fares collected this trip. Your ride is with the compliments of the Clark W. Thompson Company, whose fourth anniversary begins today. Be sure to drop in and see Galveston's big, modern department store in action.

On the opposite side there was printed:

> The value of our service to you as a shopping convenience is increasing daily. It pays to save. Ride the street cars and you will save the difference. Galveston Electric Company. R. G. Carroll, Manager.

The department store kept an hourly record of sales throughout the day and found that 33 per cent of its business, practically one-third, occurred between 9 and 10:30 o'clock. This was undoubtedly due to a large extent to the free transportation during these hours.

The department store and company inspectors observed three street corners nearest the store and found that, in practically every case, almost the entire load of passengers, after leaving the street car, headed directly for the department store.

The number of passengers hauled during the "free period" was approximately double the number usually hauled during these hours.

From the standpoint of the department store selling its wares and the railway merchandising transportation the plan was highly successful, to say nothing of the advertising both the store and the railway received.

"Public Utility Publicity" Appears

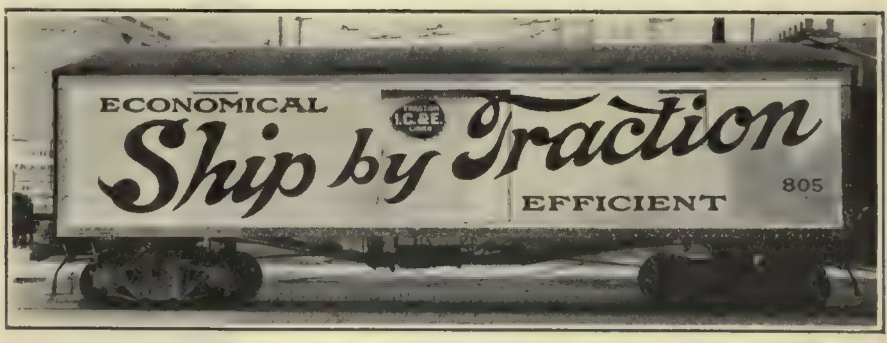
The Public Utilities Advertising Association is getting out a new bulletin called "Public Utility Publicity." The association feels that closer contact is being established between the utility and its users through the printed word and the association's purpose is to extend closer relationship between those responsible for this publicity and advertising for the good of the nation's utilities. In Vol. 1, No. 1, W. P. Strandborg, president of the association, who is connected with the Portland Railway, Light & Power Company, sends a message to the members suggesting contribution to the pamphlet by every member of the association. He says that whenever any member produces an effective piece of advertising copy he should see to it that the secretary of the association or the editor of the bulletin is supplied with a copy of the material in question so that other members may be able to secure and apply it if the copy is pertinent to them. Donald M. Mackie, Jackson, Mich., is the editor of the new sheet. The association is a department of the Associated Advertising Clubs of the World and represents the advertising and publicity departments of all the important public utilities throughout the country with a membership of more than 300.

Moving Billboards Attract Attention

The Indiana, Columbus & Eastern Traction Company and the Columbus, Newark & Zanesville Electric Railway, two of the foremost interurbans in Ohio, have been carrying on an intensive publicity campaign for some time now under the direction of Arthur V. Bland. One day somebody in the public relations department, of which Mr. Bland is the head, asked why freight cars of the companies should be allowed to travel through the country with nothing painted on them but the name of the companies and a few other letters more or less meaningless to the general public. Others in the department could see no reason for it, and then, like all inspirations—good ones—up popped the idea "billboards on wheels."

Arrangements were immediately made for running a "test car." Car No. 805 on the I., C. & E. lines had the distinction of making the first trip in her "novelty" suit of clothes. This was last spring. The freighter hadn't traveled through the country more than a day when testimonials began to pour into the publicity offices of the Red Egg Lines commending the officials on their excellent and feasible idea.

As a result of the practical application of the moving billboard idea the Red Egg Lines have profited by covering a greater amount of territory in their advertising at a very small expense for labor and materials. Instead of twenty or thirty stationary billboards scattered throughout sections of the country which the lines cover, billboards to which the public must come in order to read, the company is now carrying the billboards to the public and covering every inch of territory in which the Red Egg Lines operate.



Freight Car Converted Into Moving Billboard

The billboards on the "test" car—for both sides of the car have been utilized—are 38 ft. long and 8 ft. high. One billboard has an orange vermillion background; the letters are blue and outlined in white, while the border is blue. The other billboard has a yellow background with an orange border and the letters are done in blue.

Before the test car had been on the road a week it was decided to put billboards on every freight car on the system. Work was begun at once on about eighty cars, including motorized freight cars.

News Notes

Syracuse Bus Lines Files Application.—The application of the Syracuse Co-ordinated Bus Lines, Inc., for a certificate of public convenience and necessity for the operation of a motor bus route in the city of Syracuse was filed July 22 with the Public Service Commission. An early hearing will be held by the commission.

Hearing Deferred.—The hearing before the California Railroad Commission on the application of the Peninsular Railway, Palo, Alto, to abandon its franchise has been postponed. It is said that the company is trying to solve the transportation problem itself and that trackless trolleys are being considered.

New Franchise Proposed in Burlington.—A proposed new franchise of the People's Gas & Electric Company and the Burlington Railway & Light Company, Burlington, Iowa, will come before the Council for indorsement soon. The proposal to grant the franchise will be determined by voters of the city in an election that may be held within the next two or three months. The franchises under which the companies are operating do not expire until 1925.

Extension of Wage Scale Approved.—The proposal to extend the present wage scale for all electric light and power, electric railway and bus employees of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., for an additional six months has been accepted by the labor adjustment committees of the Employees' Mutual Benefit Association. The present standard of wages will end Dec. 31, 1924.

Bus Connections Planned.—Residents of Glenhaven Community, Portland, Ore., are promoting a plan to establish a bus service from East Eighty-second Street to connect with the new bus line which the Portland Electric Power Company plans to start early in September. At present Glenhaven people who live midway between lines traversed by the Montavilla and Rose City trolley cars have to walk long distances to secure transportation.

Paving Agreement Settled. — The fight of long standing between the Janesville Traction Company and the city of Janesville, Wis., over the question of new track and paving work as outlined in a city ordinance was finally brought to an end when the company agreed to pay for the cost of paving covering that section of its system from Mineral Point Avenue to Highland Avenue, providing it would be relieved of future paving costs upon the same street from Highland Avenue to the end of the tracks, which cost will be borne by the city. The agreement is in accordance with the suggestion made by Lewis E. Gettle, chairman of the Wisconsin Railroad Commission. The Washington line has been operated at a loss and the company applied for permission to abandon railway service and substitute buses, but with the reaching of an agreement the bus plan will be sidetracked and cars will continue to operate.

Efficient Work Rewarded.—For the efficient performance of their duties during the year ended May 31, 1924, 300 conductors and trainmen of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., who operate articulated car units shared in a bonus totaling $11,500. The individual award varied from $75 to $25. Upward of 30,000 inspections of the work of individual men were made and efficiency ratings given each conductor or trainman every time his work was inspected.

One-Man Cars Satisfactory.—Eleven one-man cars, placed in service by the Johnstown Traction Company, Johnstown, Pa., are giving better service than the two-man cars, according to a report by General Manager Shannon. Since one-man cars have been used not an accident has been reported. No complaints have been received by the company relative to safety or service of the one-man cars.

Parking Laws in Effect.—St. Louis, Mo., put into effect limited non-parking on three of the main downtown streets effective June 27. This action was taken after the Associated Retailers and other downtown merchants had protested against complete abolition of parking in Olive Street between Third and Twelfth Streets. Under the new rules no parking is permitted on Olive, Locust or Washington Avenue from Third to Twelfth between the hours of 7 a.m. and 10 a.m. and 4 p.m. and 6 p.m.

Utilities Hearing Deferred.—The rehearing on the petition of the Trinidad Electric Transmission, Railway & Gas Company, Trinidad, Col., for the abandonment of certain lines has been continued until Sept. 15.

Fare Petition Filed.—Application for extension of the single city car fare zone along the 1⅝ miles of line between Hillsdale and Lorraine Cemetery, Baltimore, was filed with the Public Service Commission recently by Linwood L. Clark, attorney. The city limits are three blocks beyond the terminus of the line and Attorney Clark alleges this line was discriminated against by the commission in a recent decision. The line is owned by the Lorraine Electric Railway, but is operated by the United Railways.

Bus Permit Granted in Jamestown.—The Public Service Commission recently granted a certificate of convenience and necessity to the Jamestown Motor Bus Transportation Company, Inc., for the operation of a motor bus line in Jamestown, N. Y., in accordance with the terms of the consent granted by the city May 14 last. A contract entered into between the bus company and the Jamestown Street Railway with respect to the issuance and acceptance of transfers is approved. The bus service will not compete with the street railway system but will supplement it. The company is also authorized to issue $50,000 common capital stock, the proceeds of which are to be used for the purchase of eleven auto buses of the pay-as-you-enter type and other equipment necessary for the operation of the line.

Wants Stage Certificate Revoked—The Warren Company, operating the Warren-Bisbee Railway, Bisbee, Ariz., is seeking the revocation of the permit held by the Warren-Lowell Stage Company on the contention that it cannot compete with the lower fares charged by the stage line. The stages serve Bakerville and Cochise. Unless the stage company's certificate is revoked, or unless the railway's fares are increased, the application declares the street car company will be forced to discontinue operation. The pending application resulted from permission granted the stage company some time ago to reduce fares from a basis of 10 cents to 5 cents per passenger. The car rate is 5 cents.

Wants Bus Operations Stopped. — General Manager Page of the Worcester Consolidated Street Railway officially notified the selectmen of Leicester, Mass., recently that the company would cease trolley service between Worcester and Leicester unless the bus line between these points ceased activities.

Divided on Bus Project.—At a recent hearing in Tacoma, Wash., conducted by F. R. Spinning, assistant director of the Department of Public Works, on the application of the Tacoma-Day Island Transit Company for a certificate of public necessity to operate a bus line between downtown Tacoma and Day Island, via Regents Park, University Place and Oakland Station, a division of public opinion was evident. Residents along the route of the proposed loop bus service expressed a desire to have the bus line, but feared that institution of bus service might mean immediate or eventual discontinuance of railway service. W. G. Rounds, superintendent of the Tacoma Railway & Power Company, stated that his company did not plan to discontinue its line to University Place, but that it would not consider any extension of the line. The bus company proposes to install a service of six trips a day on loop service each way; the railway is now operating on hourly schedule with half-hourly service at rush hours. The case was taken under advisement.

Test Case on Bus Ordinance. — To determine the constitutionality of Duluth's new bus regulatory ordinance, a test case will be instituted in the Minnesota Supreme Court by bus owners as an appeal from the order just handed down by Judge H. J. Grannis in which he upheld the bus ordinance in an action brought against the enforcement of it by bus operators. The ordinance requires all city buses to stop operating on the streets of Duluth where cars of the Duluth Street Railway are furnishing service over a double-track system. To facilitate the progress of the proposed test case, one of the bus owners caused himself to be arrested for violating the provisions of the ordinance. The voters of the city recently approved at a referendum election the passage of the bus ordinance, but the buses continued to operate under the protection of a temporary injunction granted by Judge Bert Fesler. Buses ceased operating in Duluth on July 16 on double-track car streets when Judge Grannis, in his decision dismissing the temporary injunction, held that the question involved was one not of city policy but city power. He emphasized the fact that the city was violating no contract right by enforcing the ordinance.

Help Needed in Muscatine. — The Clinton, Davenport & Muscatine Railways system in Muscatine, Iowa, will be turned over to the bondholders and creditors unless an increase in fares is granted, according to a communication which the company prepared for the City Council. The company applied six weeks ago for an increase in several classes of fare but a compromise was reached by which the only increase was to be from 50 cents to $1 for the identification cards issued monthly which permits the holder to ride for 5 cents. This ordinance was passed, six to two, on the first two readings but at the final reading an unexpected deadlock occurred which was broken by the negative vote cast by Mayor Joseph Miller. In its communication to the Council the company says that unless remedial action is taken the entire system will be immediately turned over to the creditors.

Interurban Depot Ready.—The Pacific Northwest Traction Company will shortly open its new interurban depot at Mount Vernon, Wash. The depot is complete, having large waiting rooms, ticket offices, administrative offices, restaurant and check rooms. A covered arcade between track and waiting room is provided for the stages.

Bus Permit to Parallel Railway Denied.—The New York Transit Commission has issued an order denying the application of the Nassau Bus Line, Inc., for a certificate of convenience and necessity to operate a bus line between Beach Twentieth Street and Coronado Beach, Borough of Queens. The Board of Estimate of New York City recently granted the company a new franchise covering a route which differed greatly from the route previously operated. A part of the new route parallels the line of the Ocean Electric Railway and the commission refused to issue a certificate of convenience and necessity on the ground that the bus line would duplicate unnecessarily the service provided by the Ocean Electric Railway.

Fare Increase Denied.—The Tennessee Railroad & Public Utilities Commission has declared void, effective July 1, 1924, the demand of the Memphis Street Railway for the right under a formal order of the commission to increase its rate of fare to 10 cents cash or 8 cents where tickets are purchased. By another decree of the commission which reduced the rates of the Memphis Power & Light Company to commercial users the Memphis Street Railway was benefited to the extent of about $40,000 a year. Back taxes due the city from the Memphis Street Railway are settled on an 85 per cent basis, bringing $132,000 into the city treasury.

Seven Buses Operating.—The Ottawa Electric Railway, Ottawa, Canada, has at present a fleet of seven buses operating from the end of its line to serve Ottawa East, Eastview and Beechwood Cemetery.

Foreign News

A Collection of 13,000 Tram and Bus Tickets

At one time or another everything under the sun has been collected—birds' eggs, stamps, coins, furniture, prints, autographs and cigar-bands—but it has remained for a doctor in Berlin, Germany, to collect street car tickets.

The collection comprises 13,000 different street car, motor and horse-bus tickets from every country in the world, collected in twenty-five years of travel and correspondence. The tickets are now mounted in eight large albums. They cover a period of seventy years, or as long as traffic has been organized.

A view of the albums gives a most comprehensive picture of the world's traffic. The tickets are in every conceivable shape, oblong, square, round, hexagonal and octagonal. The gayest colors, bright reds, greens and yellows, are from the Latin countries. Italy strikes an original note with bi-colored street car tickets. The dullest colored tickets are those of the Berlin buses.

One interesting index to the psychology of a nation and its officials is found in the varying sizes of the tickets. For years and years Germany and Austria were content to use street car tickets of a normal size. But with the period of money inflation, when the million and billion mark notes were as common as pennies in America, the size of the street car tickets increased to double and triple former sizes.

The vagaries of the war are often noted in the tickets. During the war Warsaw street car tickets were printed in German and Polish, supplanting the former Russian and Polish print. Then, after the war, the original languages returned.

The Only Fair Way for Traction Magnates

Type large and bold should really be used to record the fact that on July 12, on the historic old St. Andrews Golf course of Scotland, James Dalrymple, general manager of the Glasgow Corporation Tramways, was defeated by a narrow margin by William F. Ham, president of the Washington Railway & Electric Company, Washington, D. C., at the ancient and honorable game that has made Scotland famous for three reasons, two being golf and poetry.

Cable reports indicate that notwithstanding a high wind and other disturbing factors, including a huge gallery, both players appeared fresh at the end of the gruelling match as they trudged off arm in arm to adjourn to a quiet little lodge adjoining the course to partake of the newly imported American orange juice. There they joined in a toast to "The States and All Good Traction Men" and the "Bonnie Heather and All Good Tramway Men."

Washington advices indicate that Mr. Ham's handicaps at the Chevy Chase Club at Washington will be considerably revised because of his international victory at St. Andrews.

Electrification in the French Pyrenees Progresses

The Pyrenees district of southwestern France seems likely to be the next in line for electrification, following the projects in the Alps. The work will be largely in connection with the steam lines of the Chemin de Fer du Midi, running from the western Mediterranean to the Bay of Biscay. The hydroelectric power now being developed in that district as a part of what is commonly referred to as the "general electrification" of France is to be employed as the source of energy. In the Departments of the Haute-Garonne and the Tarn several interurban or feeder lines formerly operated by steam have been converted. Where already applied, the company's annual report states, running time has been reduced and traffic and receipts increased.

The work of general electrification on the main lines is advancing rapidly. In the valley of the Ossau the central station of Hourat is ready for operation. On the lines designed for 150,000 volts there is 60,000 volts in use awaiting the installation of the high-tension transformers. The equipment of the line from Dax to Toulouse is completed and all trains running between Montrejeau and Pau are run electrically. The service is to be extended as the 100 electric locomotives on order are delivered.

The equipment of the line running to the Spanish frontier from Bordeaux to Hendaye will be completed during the present summer and that from Dax to Bordeaux in 1925. The branch lines to Pierrefitte, Bagneres de Bigorre and Arreau are already operated electrically and that to the celebrated watering place of Louchon will be in operation during the present summer.

To dispose of its excess current the company has entered into an agreement with the Société des Producteurs d'Energie des Pyrenees-Orientales for its partition among industrial users of the region.

Single-Deck Cars in Glasgow.—Single-deck cars have recently been introduced on an extension of the Glasgow Tramways, where, on account of low overhead bridges, it is impossible to use the usual double-deck cars. Some of the new cars are of one-man type.

Wants to Extend. — The Compania Americana de Luz y Traccion, which operates a tramway service in Asuncion, Paraguay, South America, will petition the government for a concession to extend its service to the town of Ita, a distance of 44 km. from Asuncion.

Financial and Corporate

Michigan Line Reports Increase in Gross

Reorganized Property Reports for Year —First Five Months of 1924 Not Up to Expectations

The Michigan Electric Railway, Jackson, Mich., has been operating only since Dec. 1, 1923, it having purchased the property of the Michigan United Railways at foreclosure sale. In order that the stockholders may be more fully informed as to the property owned and its earnings, the directors decided to submit a report showing results from operation for the full year of 1923 compared with the year 1922. This they did on June 27. The earnings for 1922 and 1923, after giving effect to the reorganization of the property and the purchase of equipment formerly operated under lease, are as follows:

	1922	1923
Gross Earnings:		
City divisions.............	$1,548,204	$1,566,072
Interurban divisions.......	1,187,976	1,154,070
Total..................	$2,736,180	$2,720,142
Operating expenses and taxes	2,123,668	2,200,408
Gross income................	$612,512	$519,734
Interest and other fixed charges		408,542
Net income available for depreciation and dividends		$111,192

The volume of business done during 1923 as a whole compared favorably with the previous year. The number of passengers carried showed an increase of 394,016 on the city divisions and a decrease of 121,942 on the interurban division. The result is a net increase on all divisions of 272,074 passengers. The freight hauled showed an increase of 68,071 tons over the 1922 tonnage.

Comparative figures showing the volume of passenger and freight traffic handled during the past five years are as follows:

REVENUE PASSENGERS CARRIED

Calendar Year	City Divisions	Interurban Divisions	Tons of Freight Carried
1919	28,316,990	2,819,617	82,499
1920	26,197,444	2,670,422	97,646
1921	22,079,871	2,248,326	63,046
1922	22,987,533	1,818,134	91,482
1923	23,381,549	1,696,192	159,553

President G. R. Cottrelle says that the freight business provides a source of revenue capable of considerable development owing to the industrial growth of the territory served and the demands for fast freight service. Joint freight tariffs and through rates have been established with other lines east and south. These have opened a field for developing a very large freight business originating at or destined to western Michigan points and Chicago and eastern Michigan points. It is expected that the tonnage handled during 1924 will be considerably in excess of that handled during 1923.

Efforts are being made by the management to improve earnings through the further development of freight business, and arrangements have been made recently to extend the interurban passenger and freight service between the cities of Owosso and Flint by operation in connection with motor bus and freight trucking companies. It is hoped that these steps will bring about some favorable results, but it is unlikely that earnings will greatly improve unless more rigid legislation is adopted with respect to the indiscriminate parking of automobiles in the business sections of the cities served, and to the operation of competing motor buses between points now furnished with adequate transportation facilities by the company's interurban lines.

Under the plan for the reorganization of the former Michigan United Railways and the purchase of the property of that company by the Michigan Electric Railway $600,000 principal amount of twenty-five year first and refunding mortgage 5 per cent gold bonds were sold at 85 and accrued interest and the proceeds thereof largely provided for the cost of additions and improvements.

Mr. Cottrelle says that the passenger business of the company during 1923 suffered from the effects of the increased use of private automobiles and unregulated bus competition. These factors, together with wage increases granted to maintenance of way employees on April 1 and to trainmen on June 1, resulted in a decrease in gross income. He explains that the capital structure of the company was formed early in 1923 at the time negotiations were begun for the acquisition of the Michigan United Railways property and says that it was based on the thought that the maximum effect of competition and high operating costs had been reached and it was expected that the company would experience no difficulty in earning its interest and other fixed charges by an ample margin. These expectations, however, have not been fully realized.

A further decline in passenger business took place during the first five months of 1924. Gross earnings for that period, as compared with the same period of the previous year, decreased $60,064, while operating expenses and taxes increased $41,428, making a decrease of $101,493 in gross income. The total gross income for the five months' period amounted to $179,658 while interest and other fixed charges were $179,883, leaving a deficit of $325 before allowance for depreciation, and nothing for the financial requirements of the company.

The sum of $443,028 was expended during 1923 for additions and improvements, principally expenditures for passenger equipment formerly leased by the company.

The properties of the Michigan Electric Railway are made up of four city systems, viz.: Kalamazoo, Battle Creek, Jackson and Lansing, a line between Owosso and Corunna, and two interurban divisions which operate between Kalamazoo, Battle Creek and Jackson, known as the Southern Division, and between Jackson and Lansing, Lansing and St. Johns, and Lansing and Owosso, known as the Northern Division. The total distance measured as single track is 258 miles, of which 107 miles comprise the city systems and 151 miles the interurban systems. The majority of the interurban mileage is high-speed third-rail operation.

Plans Ahead for Reorganizing Another New York City Road

An extension for one year of the terms of the five-year deposit agreement with holders of receiver's certificates of the Second Avenue Railroad, New York, has been requested for the holders by the committee for receiver's certificates. The agreement expired on July 15 and the committee desires to extend it to July 15, 1925. Plans for the reorganization of the company and the termination of the long-standing receivership have virtually been completed, and may be effected in the late summer or early fall. For the fiscal year ended June 30 the company will report net earnings of approximately $75,000, or practically three times the income reported for the previous year. The company operates 27 miles of track.

Receiver for Kaw Valley Line Operating in Kansas

Harry C. Jobes, Kansas City, Mo., investment broker, has been appointed receiver of the Kansas City, Kaw Valley & Western Railway, a 40-mile line which operates between Kansas City and Lawrence. He was named on July 18, following the announcement made some time ago by J. J. Heim and Col. Karl D. Klemm that the company would be unable to meet the principal of mortgage bonds that come due on Aug. 1. The situation confronting the company was reviewed at length in the ELECTRIC RAILWAY JOURNAL for July 19, page 103.

Brooklyn Income $4,000,000

For the year ended June 30, 1924, the net income of the Brooklyn-Manhattan Transit System and affiliated companies, Brooklyn, N. Y., was $4,022,065. The comparative statement of earnings and expenses for the first year of operation since the lifting of the receivership is as follows:

	—Year ended June 30—	
	1924	1923
Total operating revenues.	$40,072,326	$36,899,294
Total operating expenses.	26,499,408	23,841,876
Net revenue from operation..	13,572,917	13,057,417
Taxes on operating properties...............	2,738,946	2,596,505
Operating income........	10,833,970	10,460,912
Net non-operating income	950,455	*
Gross income...........	11,784,425	*
Total income deductions.	7,762,360	*
Net income.............	4,022,065	*

* Figures omitted afford no comparison on account of receivership and reorganisation.

Earnings of Chicago Surface Lines Up for Six Months

The earnings of the Chicago Surface Lines showed a sharp falling off during June, both in comparison with May and with the corresponding month of last year. Earnings for the six months of 1924 are considerably above the similar period in 1923.

Gross for the six months was $29,309,810. This compares with $28,319,890 in 1923, according to a compilation of the monthly figures for the period. The residue receipts for this year to date totaled $5,777,537, against $6,654,932 in 1923. The company's 45 per cent of divisible receipts shows the most drastic shrinkage. For six months of this year that item has run $621,440, or almost half the $1,012,766 in the corresponding period of last year. For June gross earnings declined and expenses increased over last year. Residue receipts for the month were $927,970, against $1,032,947 in May and $1,099,202 in June, 1923.

Confident $5,000,000 Will Be Refunded

At a recent hearing on an agreement between the city of Philadelphia, Pa., and the Philadelphia Rapid Transit Company, whereby the city undertook to attempt to recover more than $5,000,000 of Federal income and excess profits taxes paid by the company, Thorpe D. Nesbit, counsel for the railway, stated that under the new Federal income tax law public service corporations in which municipalities have an interest were no longer exempt from the payment of income taxes.

The city entered into an agreement with the company some time ago to make every effort to collect upward of $5,000,000 which the company has paid, with the stipulation that if the money is recovered it would be used for extensive improvements to the transit company's service. Commissioner Clement expressed approval of the agreement and confidence that the city could recover the $5,000,000 taxes. Commissioner Clement said he understood that if the city recovered the taxes the company would thereafter be relieved of the payment of income taxes, but Mr. Nesbit said that the law had been amended so that it no longer contained the tax-exempt provision. It was Mr. Clement's deduction that Congress believed a mistake had been made in including the exemption in the 1916 act. The new work that is proposed, should the taxes be refunded, includes extensive track and line improvements and over-passage and connecting platforms.

Elmira Company Carried More Passengers in 1923

The year 1923 was the best in the history of the Elmira Water, Light & Railroad Company, Elmira, N. Y., both in point of gross and net earnings and in general expansion of property and the territory served. This statement was made at the annual meeting on June 5. The company's city lines carried more passengers in 1923 than in either 1922 or 1921 and there was not a single serious accident to any passenger. In addition, a great deal of construction work was accomplished during 1923. The city's paving program compelled the company to do extensive trackwork and to permit better service to a large and rapidly growing section. South Main Street was changed from a single-track to a double-track system. The gross revenue of the railroad department in 1923 was $495,509, against $510,646 in 1922 and $502,951 in 1921.

Abandonment Date Advanced

The Public Utilities Commission of Ohio has advanced to Aug. 1 the date for abandonment of the lines of the Cleveland & Eastern Traction Company. The first date set was July 1, but the road continued to operate. Robert D. Beatty, general manager, has explained that the road may continue to operate after Aug. 1 by asking for another extension. He is reported to have said:

> It merely covers our present position, in which we are operating full service, although we have been permitted to quit. We can't really say what we will do. Of course, we will not keep on indefinitely.

The interurban line gave service in the morning and evening for a few days, but the Utilities Commission ruled that service would have to be given on full schedule or not at all. So the line has been operating as usual. The road is 40 miles long. It runs from Cleveland to Gates Mill, Chardon and Middlefield.

Payment of Stock Dividend by Brooklyn Road Approved

The New York Transit Commission, in an order made public on July 18, will permit the Brooklyn City Railroad to issue $4,000,000, par value, of additional capital stock for the purpose of acquiring rolling stock worth that much which the company has been using, but which belonged to the Brooklyn City Development Corporation, organized a few years ago for the purpose of buying the cars involved.

The action of the Transit Commission was based upon the recommendation of Gen. John F. O'Ryan, member of the commission.

The Brooklyn City Railroad operates surface lines independently of the Brooklyn-Manhattan Transit Company (subway lines). In explaining the effect of the issue of this additional $4,000,000 of capital stock, Gen. O'Ryan said:

> So far as the car-riding public is concerned, certainly it is beneficial to have the petitioner (Brooklyn City Railroad) acquire these cars. So far as the stockholders are concerned, there is no claim that the stock is not worth the amount paid for it. There is no question involved as to the protection of shareholders or investors.
>
> Both in form and substance as well as in effect the $4,000,000 was spent for the purchase of cars and the stock is to be issued for the $4,000,000. If the stockholders were to buy $4,000,000 of stock for that much cash and the railroad bought the cars direct, there would be no question as to the propriety of the transaction. As it is, the petitioner is accomplishing precisely the same thing by another means and I fail to see any legitimate objection, either legal or practical, to the method taken. The effect of the transaction is to use money which might have been paid to the petitioner's stockholders in dividends, to purchase new equipment.

The transfer of the rolling stock to the Brooklyn City Railroad includes the plan to dissolve the Brooklyn City Development Corporation, thereby simplifying any future financial transactions of the Brooklyn City Railroad.

The stock will be issued pro rata in

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	July 1924 6.98	June 1924 6.97	July 1923 6.92	May 1921 7.24	May 1923 6.88
Street Railway Materials* 1913 = 100	June 1924 158	May 1924 161	June 1923 171	Sept. 1920 247	Sept. 1921 156
Street Railway Wages* 1913 = 100	June 1924 221	June 1924 220	July 1923 212	Sept. 1920 232	Apr 1923 207
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	June 30 1924 3.26	May 31 1924 3.63	June 30 1923 6.39	July 31 1920 11.12	June 30 1924 3.26
U.S. Bank Clearings Outside N. Y. City (Billions)	June 1924 15.25	May 1924 15.83	June 1923 16.12	Mar. 1920 16.54	Feb. 1922 10.65
Business Failures Number	June 1924 1,561	May 1924 1,744	June 1923 1,366	Jan. 1924 2,258	Sept. 1923 1,280
Liabilities (millions)	38.05	70.94	51.71	109.1	27.50

Conspectus of Indexes for July, 1924

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	July 1924 214.4	June 1924 216.8	July 1923 222.1	June 1920 273.8	Mar. 1922 162.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	June 1924 144.5	May 1924 146.9	June 1923 153.5	May 1920 247	Jan. 1922 138
Bradstreet's Wholesale Commodities 1913=9.21	July 1 1924 12.23	June 1 1924 12.29	July 1 1923 13.09	Feb. 1 1920 20.87	June 1 1921 10.62
Dun's Wholesale Commodities 1913 = 120.9	July 1 1924 185.5	June 1 1924 183.8	July 1 1923 188.7	May 1 1920 263.3	July 1 1921 159.8
U.S. Bur. Lab. Stat. Retail food 1913 = 100	June 1924 142	May 1924 141	June 1923 144	June 1920 219	Mar. 1922 139
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	June 1924 161.7	May 1924 161.4	June 1923 160.1	July 1920 204.5	Aug. 1922 154.5

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

the form of a dividend to present holders. The stock is $10 par value and the number of shares will be increased from 1,200,000 to 1,600,000. Thus the distribution amounts to a 33⅓ per cent dividend.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons there were sold this week $1,000 of Manhattan Railway, New York, 4 per cent bonds, due 1990, 62½ per cent.

Jersey Properties Merged. — The Board of Public Utility Commissioners of New Jersey recently approved the merger of the Central Passenger Railway and the Venice Park Railroad, both of which operate in Atlantic County. The amalgamation will be known as the Central Passenger Railway.

May's Return Falls Short. — The Seattle Municipal Railway's total receipts in May were $512,028. This amount took care of all operating expenses and fixed charges, but fell short some $40,000 of the amount due to be set aside for bond redemption. Rolling stock and roadbed repairs made heavy inroads on the receipts. With an allowance of $57,093 for depreciation, operating expenses totaled $428,902 and interest payments aggregated $63,069.

Trust Notes Sold.—Putnam & Company, Hartford, have sold at 100 and interest $450,000 of 6 per cent equipment trust gold notes of the Connecticut Company known as series "G." The notes were dated June 15, 1924. The equipment for the payment of which these notes were issued consists of fifty convertible steel passenger cars each with a seating capacity of fifty-six passengers, and twenty convertible steel passenger cars each with a seating capacity of thirty-two passengers. The equipment was purchased in 1918 for the company with funds furnished by the United States Housing Corporation. By the payment of the loan to the United States Housing Corporation, the interest charges of the company will be substantially reduced.

Sale of Property Announced. — The property of Buffalo & Lake Erie Traction Company will be offered at public sale in Buffalo on Aug. 27. The road has been in receivership for several years. It is said that one syndicate of bondholders composed of Erie, Pa., men will bid for the lines in that city and that another syndicate headed by New York men will bid for the company's interurban lines, which extend for more than 100 miles.

Alabama Line Files Petition for Abandonment.—The Alabama Traction Company, Albany, Ala., petitioned the Alabama Public Service Commission on July 15 for authority to discontinue railway service in Decatur and Albany. It is set out in the petition that the revenues from the railway are not sufficient to meet the operating expenses. Before filing the petition officers of the company and citizens of Decatur and of Albany met with A. G. Patterson, president of the Alabama Public Service Commission, and disdiscussed ways and means of continuing the railway service, but failed to arrive at any definite conclusion. The railway system consists of 7.65 miles of line connecting Albany and Decatur, Ala., with local lines operating in both towns.

Abandonment Allowed. — New York State Public Service Commission has authorized the Peekskill Lighting & Railroad Company, Peekskill, N. Y., to abandon its railway line from Peekskill to Five Mile Turnpike near Lake Mohegan, owing partly to unprofitable operation. The public will be served by a bus line which already parallels this route. The application has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Financing Approved.—At a meeting of the stockholders of the Detroit United Railway, Detroit, Mich., stockholders ratified a $10,000,000 five-year, 6 per cent bond issue. The bonds under this issue, as previously indicated in the ELECTRIC RAILWAY JOURNAL, have all been sold.

Southern Pacific Reported After Phoenix Railway.—One of the local papers at Phoenix, Ariz., said recently that rumor had it that the Southern Pacific Company intends to buy outright the Phoenix Railway and put the property in first class shape as a feeder for the Southern Pacific in reaching territory in the valley now not covered by that railroad. The belief was expressed that the electric railway lines would be extended to include territory not now covered by any railroad operating into Pheonix. The local system at Phoenix includes 32 miles of track.

Farmers Buy Illinois Line.—A deal was closed on July 9 by which Kendall and Grundy County farmers will probably buy, for $89,000, the Fox & Illinois Union Railway, Aurora, Ill. At a hearing before the State Commerce Commission auditors for the commission reported that the road had made $8.35 above operating expenses in seven months. Out of that amount was to come interest on the investment, on borrowed money and taxes. The owner of the road, Arthur Evans, Aurora, had sought permission of the commission to cease operations and to sell the railroad for junk.

Net Income Decrease.—For the twelve months ended June 30, 1924, the Brooklyn City Railroad, Brooklyn, N. Y., had a net corporate income of $2,052,119, against $2,256,025 for the period ended June 30, 1923. Passenger revenue advanced from $11,715,964 to $11,774,929 for the twelve months ended June 30, 1924. Operating expenses and taxes advanced from $9,315,234 to $9,610,002 for the period ended June 30, 1924.

Final Rites in Behalf of Interborough-Metropolitan Holders. — The protective committee representing the holders of the 4½ per cent bonds of the Interborough-Metropolitan Company, New York, is notifying holders of receipts for certificates of deposit that on July 22 it will make a final distribution of $3.85 for each $1,000 principal amount of bonds represented by series A receipts for certificates of deposit, and $1.54 for each $1,000 principal amount of bonds represented by series B receipts. The notice marks the final step in the winding up of the affairs of the protective committee, and virtually also those of the old Interborough Consolidated Corporation, which went into bankruptcy. Since the Interborough Consolidated, as the old holding company for the Interborough Rapid Transit Company properties, went into receivership and the assets were sold under foreclosure, the preferred shares which before the war were worth around $90, and the common shares, which were sold at about a third of this figure, dropped to virtually nothing.

Creditors Will Share in Sale Receipts.—Recognized creditors of the defunct Lorimer & Gallagher Construction Company, Chicago, Ill., builders of the Southern Traction line from East St. Louis to Belleville, Ill., are to share pro rata in approximately $250,000 according to an order of distribution handed down by United States District Judge English in East St. Louis on July 9. The bulk of the money was derived from the sale of part of the traction line in 1919. This amount represents about one-third of the sum originally sued for by the contracting firm in 1914 when it filed its claim against the traction company for construction work. Both construction company and traction line subsequently passed into the hands of receivers.

Additional Million Offered. — The National City Company, New York, N. Y., is offering at 98½ and dividend to yield 7.10 per cent an additional $1,000,000 of 7 per cent cumulative prior preferred stock of the Portland Electric Power Company, Portland, Ore. The stock is known as series "A." The proceeds of the sale will reimburse the company for construction expenditures including those made in connection with its new hydro-electric station, the first unit of which is expected to be in operation on or about Aug. 1, 1924. The company supplies electric light and power to the city of Portland, operates the city and interurban railway lines in Portland and adjacent territories.

Coatesville Road Sold. — Jacob V. Pennegar, Coatesville, has sold the property of the Coatesville Trolley Company, a little more than 1 mile in length, on First Avenue, Coatesville, to Charles E. Cooke, William P. Kelly and Thomas L. Hodge, Philadelphia, for $6,500. The rails were laid several years ago but the road never was operated and finally the court appointed a receiver from whom Mr. Pennegar purchased the line. It is said that the purchase really means the acquiring of the road by the West Chester Street Railway, which will establish a connection with its line at Coatesville and operate the branch to the Bethlehem Steel Mills at Hustonville.

Balance Decreased.—Gross earnings of the Virginia Railway & Power Company, Richmond, Va., during the first six months of 1924 were $5,248,508, an increase of $49,013 over a similar period a year ago. Operating expenses and maintenance, taxes and rentals reached $3,283,174 and the balance after subtraction of interest and sinking fund charges was $593,347. This balance is $92,670 less than it was a year ago. For June the balance was $75,581, a decrease of $23.572 compared with June, 1923.

Personal Items

Horatio Bigelow Advanced

Company at Charleston Appoints Its Former Publicity Agent New Superintendent—Career of Twenty Years

Horatio Bigelow has been appointed to the position of superintendent of railways of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C. He has been connected with this company since November, 1922, when he took the position of publicity agent. In August, 1923, he was appointed superintendent of transportation and in January, 1924, he assumed the duties of acting superintendent of railways, replacing F. A. Bailey, resigned.

Horatio Bigelow

Mr. Bigelow began his street railway career with Stone & Webster in 1900. After he was graduated from Harvard University in 1899 he went to work as a chainman for the Seattle Electric Company. After filling various minor posts with this company he rose to the position of assistant superintendent at Seattle.

But early in 1903 a better opportunity presented itself with the resultant assumption by him of the managership of the Ponce Electric Company, Ponce, P. R., which was also under the Stone & Webster management. After a year's experience at Ponce he returned to the United States to manage the three independent companies operating the street railway in Norwich, Montville and New London, Conn. He remained in this capacity after these companies were taken over by the Connecticut Company and together with additional lines were made the New London division of that company.

At this time Mr. Bigelow served as vice-president of the New England Street Railway Club. He severed his connection with the Connecticut Company in 1908 and was instrumental in organizing, building and operating the Thames River Specialties Company, in which he served as vice-president and treasurer. This company manufactured paper board. In 1917 he moved to the South and bought a plantation near Charleston, S. C., which he operated as a stock farm.

James P. Argersinger, Johnstown, N. Y., has been elected vice-president of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., succeeding the late John G. Ferris.

B. S. Jerman was recently elected president of the Carolina Power & Light Company, Raleigh, N. C. He succeeds the late Col. Charles E. Johnson. The Raleigh company operates 14.33 miles of railway and does general lighting, power and gas business.

Capt. Francis J. Sinnott has been appointed to the post of secretary to the Board of Transportation of New York City. He was named by John H. Delaney, chairman of the board. The captain won his rank during the war while serving with the 302d Engineers of the Seventy-seventh Division. He was associated as an engineer with Frederick Cranford, New York, from 1913 to 1917. The new board, a city body, is charged with the work of planning and carrying out future rapid transit construction. Its functions are not regulatory in their nature.

Malcolm M. Inglis, who has been manager of the public utilities of Port Arthur, Ontario, for nine years, is leaving that position to become assistant to the vice-president of the Brazilian Traction, Light & Power Company, at Rio de Janeiro. The utilities at Port Arthur are under municipal control. They include the Port Arthur Civic Railway, a system of 19.5 miles, operating in Port Arthur and connecting with Fort William.

John H. Ryan, a member of the staff of the insurance firm of Johnson & Higgins, was recently appointed a member of the Westchester County Transit Commission. This commission was organized for the purpose of collaborating with the commissions of New York City and New Jersey charged with the work of supervising transit affairs and the various railroad officials in working out a plan to provide improved facilities for the commuters to New York City from Westchester County, New Jersey and Long Island. Mr. Ryan a few years ago was a division superintendent of the Brooklyn transit system. He entered the service of the Brooklyn Heights Railroad in 1897 as a conductor. He received many promotions becoming assistant superintendent at Ridgewood, Bergen Street and East New York Depots. Following his transfer from the operating department to the position of shop foreman at the East New York surface shop he resigned to join the insurance firm of Marsh & McLennan. Here he was assigned the task of investigating railroad properties in all parts of the country. Following his attachment to the United States Shipping Board during the war he became associated with Johnson & Higgins.

A. C. Moorhaus Enters on New Duties at Cincinnati

After serving with the Scioto Valley Railway & Power Company, Columbus, Ohio, as secretary and purchasing agent for twelve years, A. C. Moorhaus left that utility on July 1 to become purchasing agent for the Union Gas & Electric Company, Cincinnati, Ohio, and its subsidiaries. Mr. Moorhaus is a Cincinnatian by birth. He was graduated from the University of Cincinnati. As purchasing agent for the Union Gas & Electric Company, he also will have jurisdiction over the purchases of the Union Light, Heat & Power Company and the Cincinnati, Newport & Covington Railway, Covington, Ky., Ohio Gas & Electric Company, Dayton Gas Company, Dayton, Ohio, Hamilton Service Company, Hamilton, Ohio, Columbia Power Company, Columbia Gas Company and the Columbia Gas Supply Company. Mr. Moorhaus has his headquarters in Cincinnati. He succeeded C. J. Bauer, who died several months ago.

A. C. Moorhaus

Obituary

Charles J. Jones, chief engineer and superintendent of way and structures of the Chicago, Aurora & Elgin Railway, died at Wheaton, Ill., on July 10. Mr. Jones was sixty-two years of age. He was formerly chief engineer of the Lorain Steel Company, but resigned in 1899 to become chief engineer for Cleveland interests which purchased the local and the interurban electric railways in and around Aurora and Elgin, Ill., and which later built the double-track, third-rail, high-speed interurban line between these cities and Chicago. Mr. Jones was in charge of the surveys and construction. He was for a time both chief engineer and superintendent in charge of operation.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Brill Service Car Operated by Boston & Maine Railroad

The J. G. Brill Company, Philadelphia, has built a gasoline motor car which was recently put into service by the Boston & Maine Railroad on the Ashburnham branch, between South Ashburnham, on the main line of the Fitchburg division, and Ashburnham, a distance of 2.64 miles. It is a single-unit car with a seating capacity of forty passengers and a baggage department. It is of all-steel construction, lighted by electricity and heated by a hot-water system. Another type gasoline motor car has been ordered by this road from the Sykes Company, Kenosha, Wis. This car is expected to be delivered within a few weeks. The car will accommodate thirty passengers. If the Boston & Maine Company finds this method of operation economical or profitable more of the gasoline cars will be used instead of steam trains.

New Reo Sedan Type of Cross-Country Bus

Completely equipped in every respect and planned for utmost comfort to the slightest detail, the new Reo sedan type of cross-country bus has just been announced by the Reo Motor Car Company. It adds to the equipment designed for long-distance bus travel.

Long and low in lines and brightly finished in body coloring and trimmings, this new model is the latest addition to the Reo line. The same special bus chassis is used for the new Reo bus as is used in connection with the pay-enter type which was announced by the Reo company a few months ago. This chassis was especially designed for use in passenger transportation. The only change is the fact that 32x6 single tires are regular equipment on both front and rear wheels in this latest model, whereas dual tires are standard on the pay-enter type.

The body of the new de luxe Reo sedan bus is divided into three compartments—driver's, passenger's and smoking compartment. Exclusive of the driver's compartment, the bus has a minimum seating arrangement for sixteen passengers and is, therefore, the rated capacity of the bus. However, when permissible under the law, a maximum load of twenty passengers may be carried on the seats. It is not intended to carry any standees, and no provision has been made for them.

A bus of the new type started from New York on July 22 on a run from coast to coast.

Metal, Coal and Material Prices

Metals—New York	July 22, 1924
Copper, electrolytic, cents per lb.	12.80
Copper wire base, cents per lb.	14.50
Lead, cents per lb.	7.05
Zinc, cents per lb.	6.27
Tin, Straits, cents per lb.	48.50
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.325
Somerset mine run, Boston, net tons	2.00
Pittsburgh mine run, Pittsburgh, net tons.	1.875
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons.	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.00
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags.	2.20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.03
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.625
Turpentine (bbl. lots), N. Y., per gal.	$0.83

Rolling Stock

Seattle, Wash.—The Board of Public Works will take bids until Aug. 15 for furnishing not less than 75 nor more than 125 cars in accordance with plans and specifications approved by the board on June 27. Bids must be accompanied by a certified check or bond in an amount equal to 5 per cent of the total bid.

Grand Rapids Railway, Grand Rapids, Mich., suffered the loss of sixty-five cars on July 19, when its largest carhouse took fire. The company will purchase new cars to replace the loss. Among the cars which burned were eight large steel cars made by the St. Louis Car Company, nine Birney one-man cars, ten 30-ft. maximum traction truck cars, three 30-ft. Kuhlman cars, five St. Louis 28-ft. double-truck cars, seven old Brownell cars, four open cars, three single-truck box cars, a private car, the "Honolulu," used in the old days for advertising purposes, four snow scrapers, two sand cars and two snowplows.

Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, has replaced its old bus equipment, consisting of Studebakers, with a fleet of eight Fageol intercity model safety coaches. Six have arrived and have been placed in service on the Springfield and Columbus run. As soon as the two remaining coaches arrive, through service will be completed to Dayton, Ohio. The bus subsidiary is known as the Dayton & Columbus Transportation Company.

Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, has purchased two intercity Fageol safety coaches for use in limited service from Columbus, Newark and Zanesville. They will be operated in addition to the present fleet of seven Studebaker cars out of the new bus terminal. The bus subsidiary is called the Columbus & Zanesville Transportation Company.

Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., has ordered ten double-deck buses. Delivery is expected about Aug. 1. The details of the proposed service in which the new vehicles will be used have not been definitely determined, but as indicated in the article elsewhere in this issue it is the intention of the company to use the buses in the rapidly developing outlying sections.

Morris County Traction Company, Morristown, N. J., will receive some time next month the ten cars referred to in the ELECTRIC RAILWAY JOURNAL, issue of July 5, 1924. The detailed specifications of the cars are as follows:

Date order was placed	June 3, 1924
Builder of car body	Osgood-Bradley
Type of car	Double-truck safety
Seating capacity	48
Total weight	3,000 lb.
Bolster centers, length	21 ft. 4½ in.
Length over all	41 ft. 10 in.
Truck wheelbase	5 ft. 6 in.
Width over all	8 ft. 4½ in.
Height, rail to trolley base	11 ft. 1½ in.
Body	Semi-steel
Interior trim	Cherry and white mahogany
Headlining	Agasote
Roof	Arch
Air brakes	Westinghouse
Armature bearings	Roller
Axles	A.E.R.A. Standard E2
Bumpers	Non-climbing
Car signal system	Faraday
Car trimmings	Natural mahogany
Control	G.E., K 35
Curtain fixtures	Crown
Curtain material	Fabrikoid
Destination signs	Hunter
Door operating mechanism,	National Pneumatic
Fenders	Pilot type
Gears and pinions	General Electric
Hand brakes	Peacock staffless
Heater equipment	Consolidated
Headlights	Golden Glow
Journal bearings	M. C. B.
Lightning arresters	Aluminum
Motors	G.E. 258, outside hung
Exterior finish	Enamel
Registers	Ohmer
Sanders	Air operated
Seats	Heywood-Wakefield
Seating material	Rattan
Step treads	Kass
Trolley base	Ohio Brass
Trucks	Osgood-Bradley
Ventilators	Osgood-Bradley
Wheels	26-in.
Special devices, etc.	Full safety equipment
Power-saving device	Economy meters

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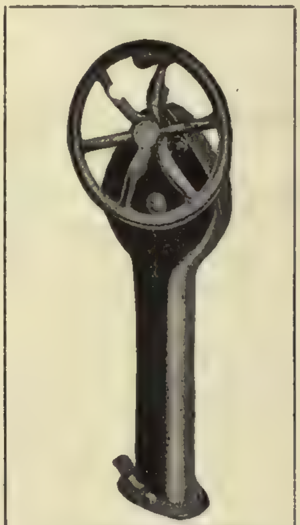

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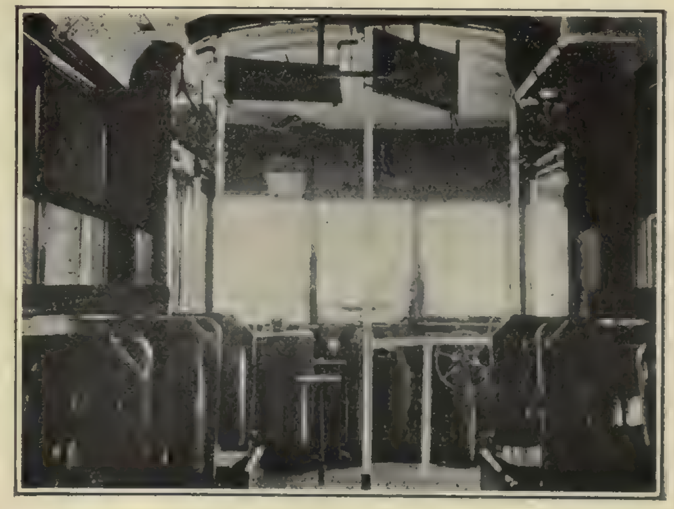

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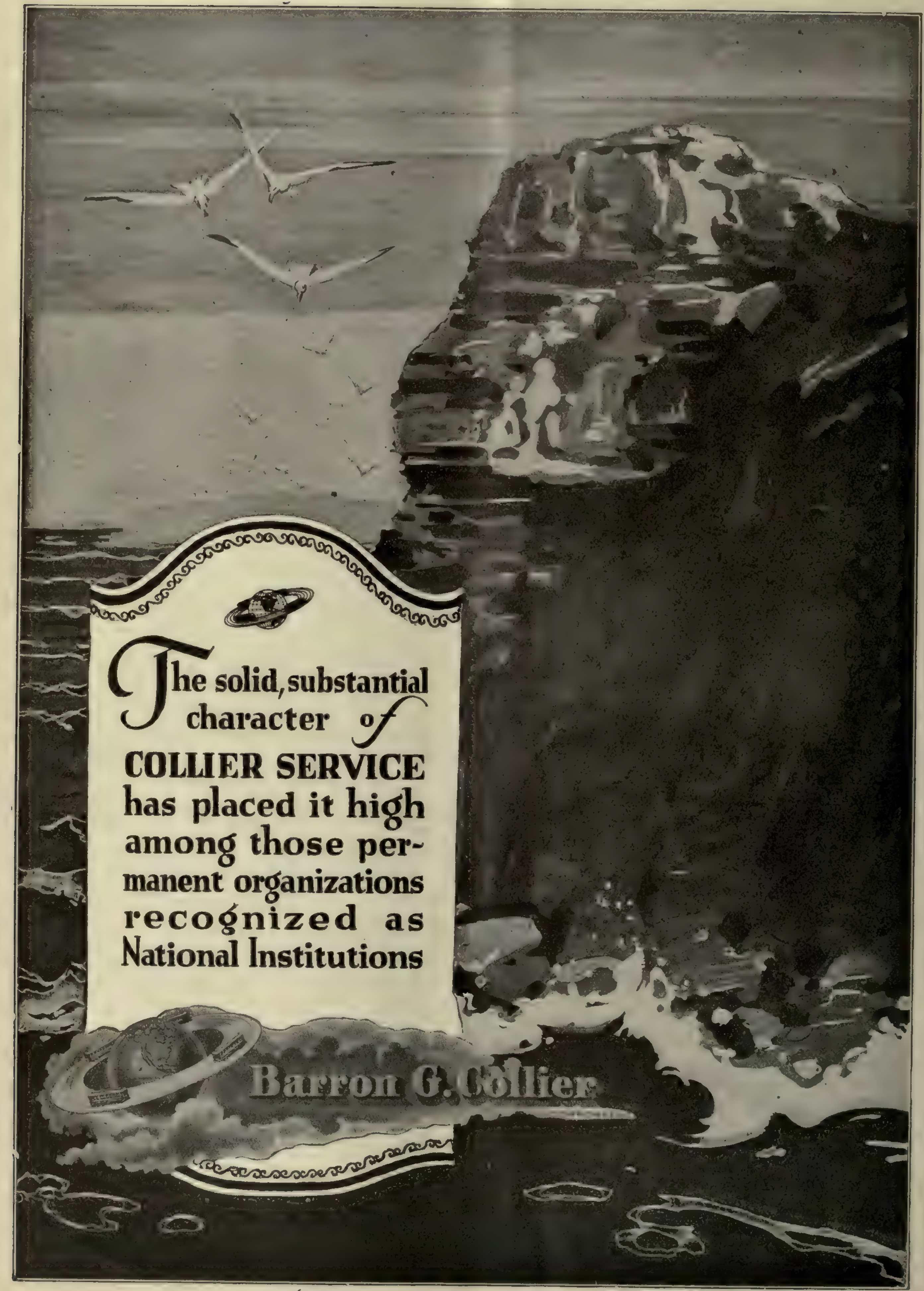

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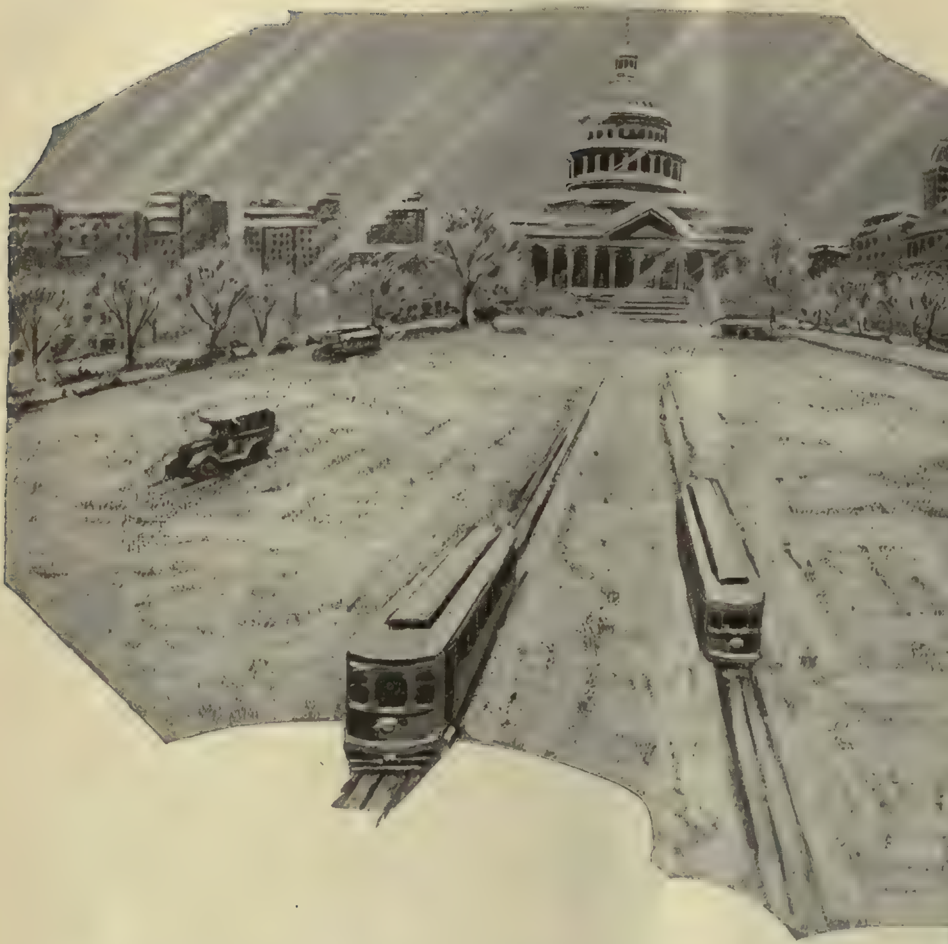

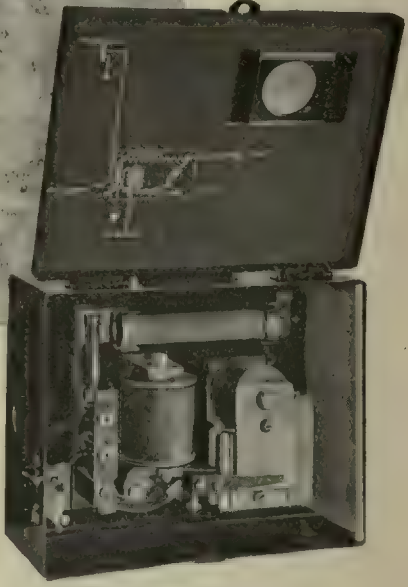

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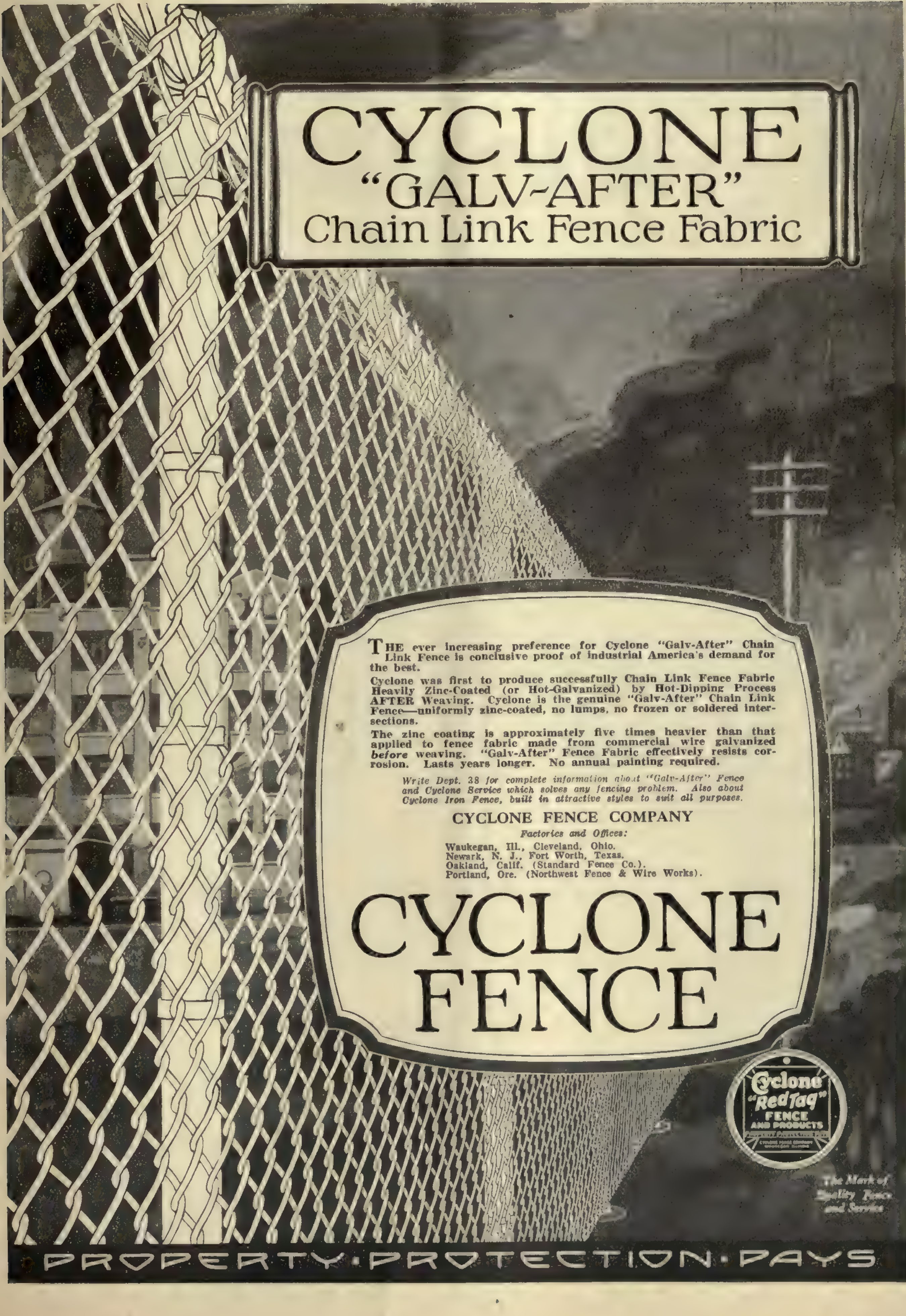

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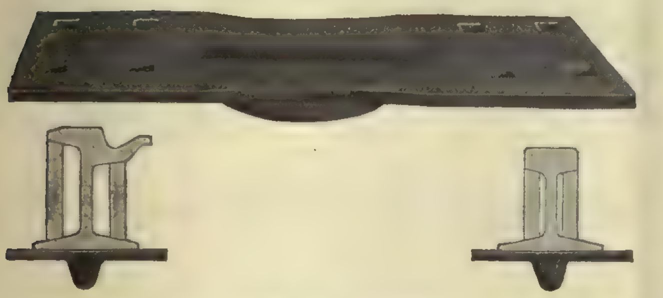

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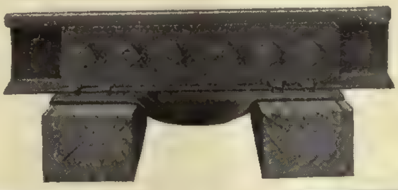
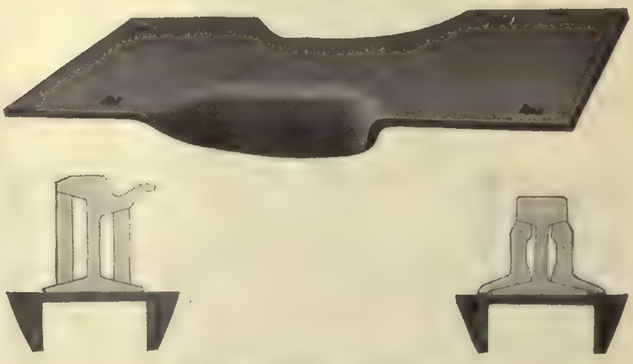
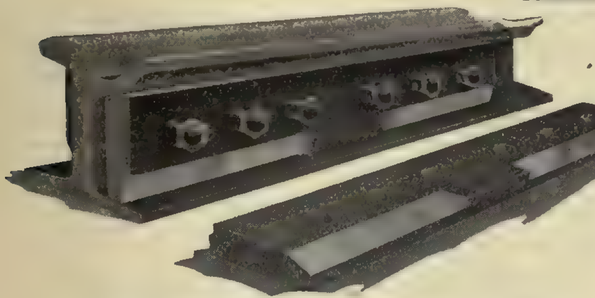
The Center Rib Base plate provides reinforcement and support directly under the center of the rail. It supports the joint and prevents "battering," or "cupping" of the rail ends. It is designed for use with either bolted or welded joints — in the latter case the plate is usually welded to the rail, thus imparting additional strength and stiffness to the joint. Particularly adapted for reinforcing old joints.





Abbott Base Plate

In the Abbott Base Plate the reinforcement is located on each side of the rail instead of in the center. The joint is thus supported and "battering" and "cupping" of the rail ends is prevented. It may be used with either bolted or welded joints — in the latter case it is usually welded to the rail, thereby imparting additional strength and stiffness to the joint. Particularly adapted for reinforcing old joints.



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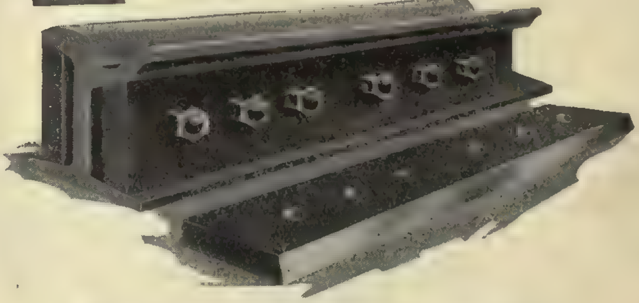

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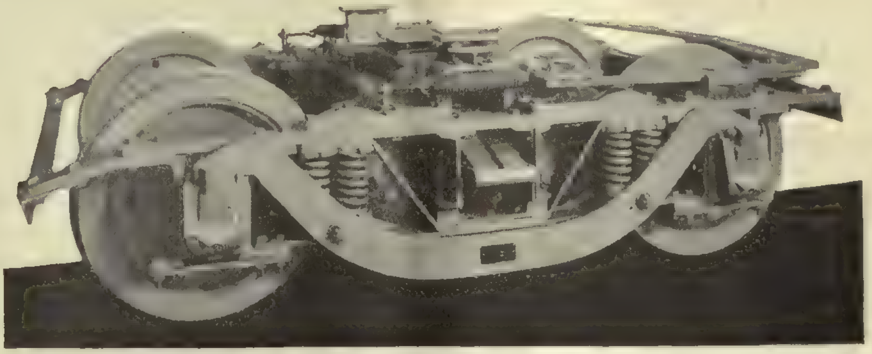

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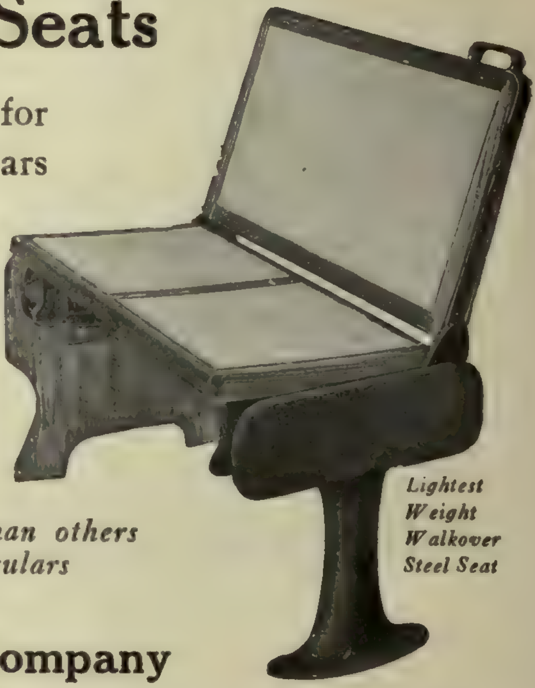

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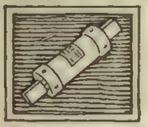

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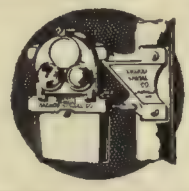

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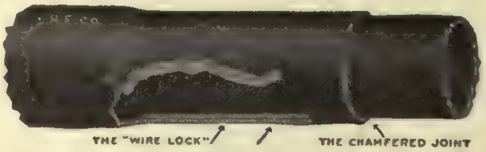

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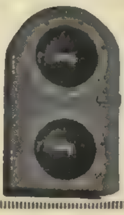

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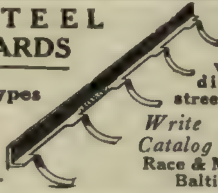

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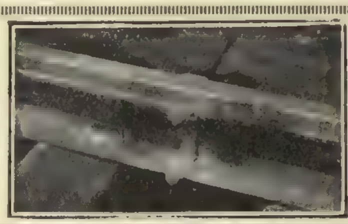
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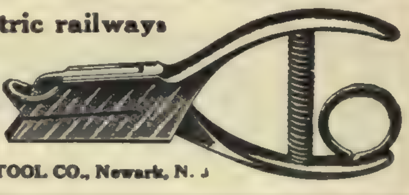
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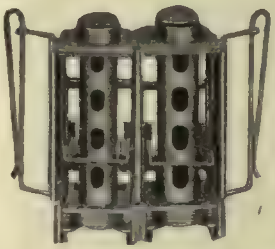

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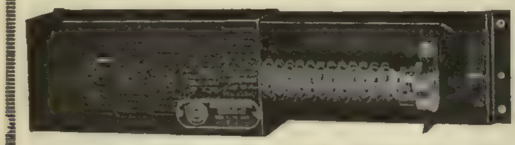

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Ingersoll-Rand Co.

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Elec. Service Supplies Co.
Ohio Brass Co.
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Ramapo Ajax Corp.

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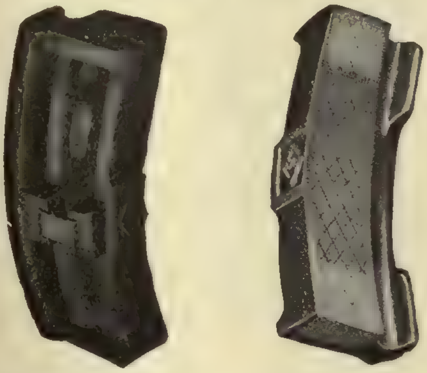

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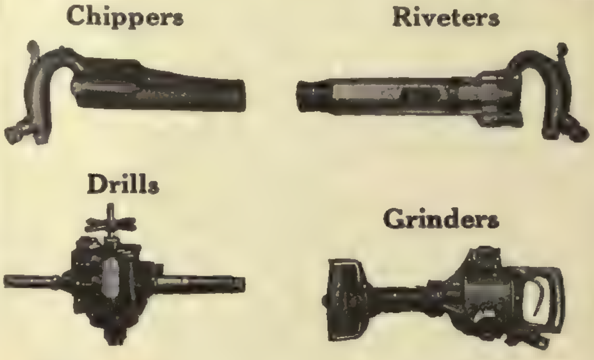

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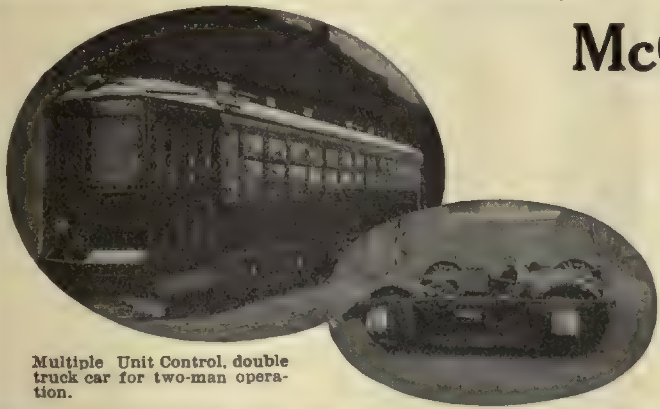

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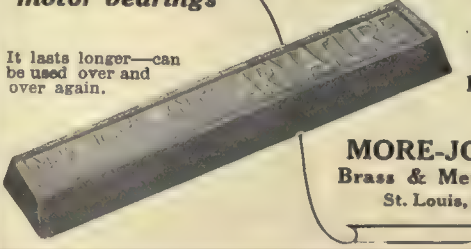

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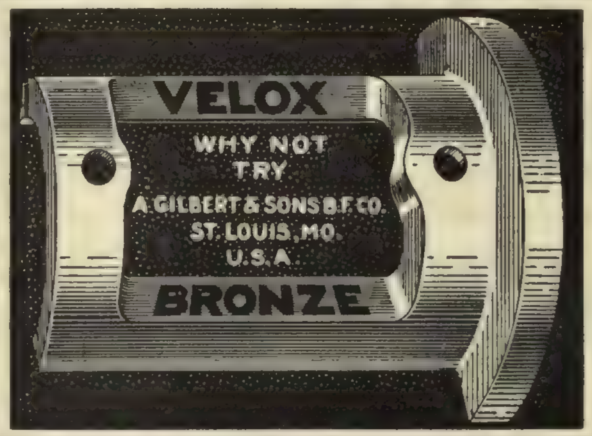
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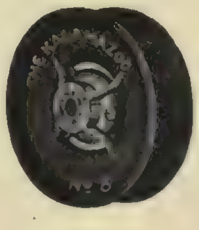

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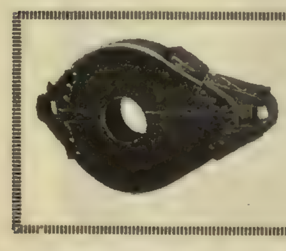

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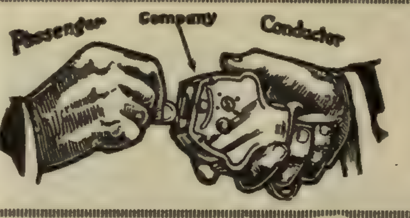

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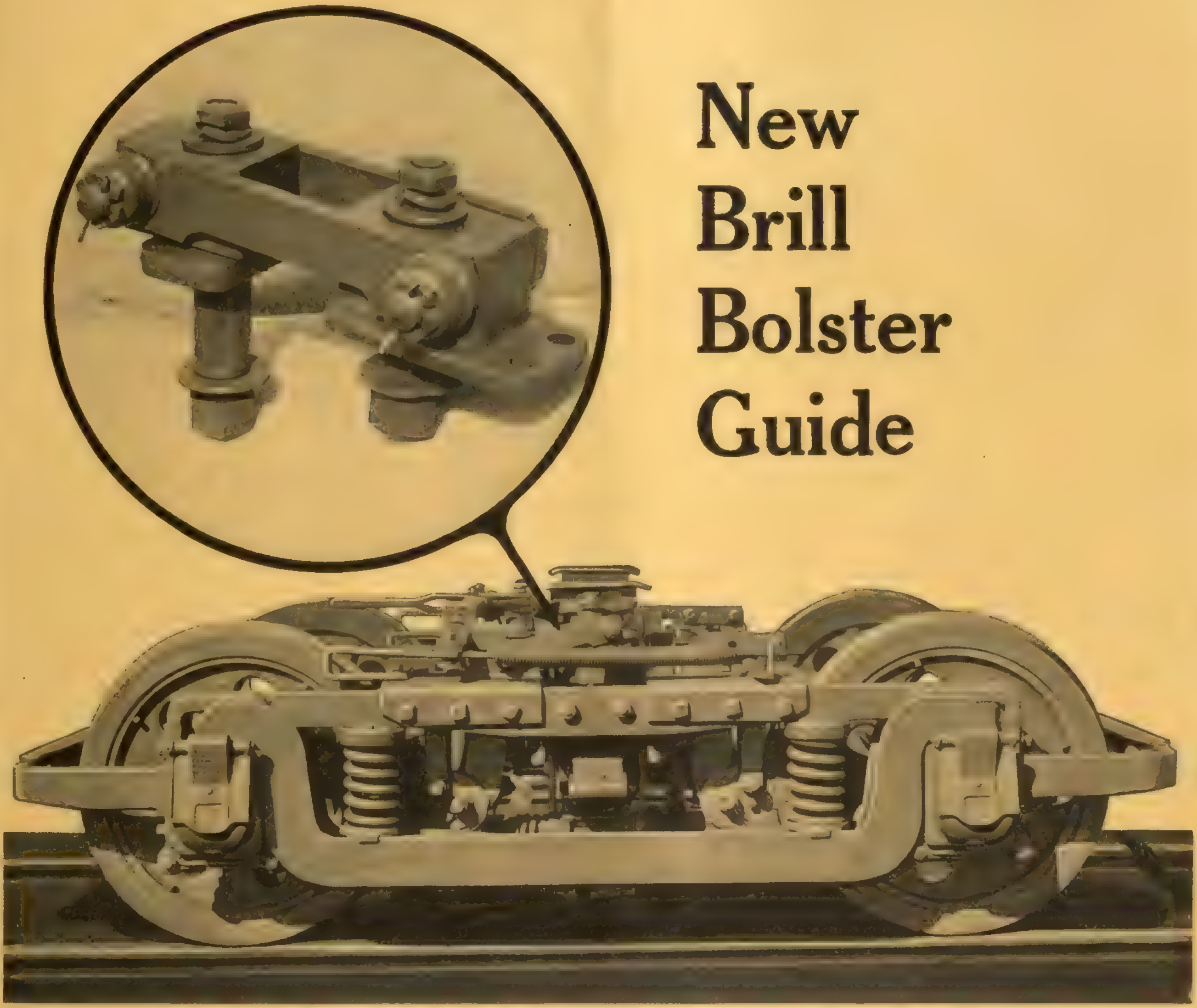
J. R. JOHNSON AND CO., INC.
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.



New Brill Bolster Guide

Easy to install and functions with minimum wear of truck parts

The Brill Bolster Guide is a patented feature of all Brill pivotal trucks. It retains the bolster in its vertical position and prevents contact with the transoms under motor and brake pressure.

In order to facilitate its easy installation the drop forged trunnion pins are now made to fit snugly into the bolster end and gusset plates instead of being pressed or driven in. Both pins are flanged as shown in the illustration, the longer one passes through the bolster and is held by the nut underneath and a clamp which fastens this flange to the bolster; the flange of the shorter trunnion pin is also bolted to the gusset plate, thus preventing any movement of the bolster guide.

This feature and the special treatment of the trunnion pins and blocks insures minimum wear of this device and of the truck parts to which it is attached.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO SPRINGFIELD MASS.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION

On the Aurora, Elgin & Fox River

Light-Weight City Cars

Showed the way to

Light-Weight Interurbans

"—And both the company and the public are pleased with the cars and with the service they are giving."

A familiar testimony of satisfaction realized from G-E Car Equipment consistently selected for modern light-weight cars.

In this case, the city cars are equipped with GE-264 Motors and K-Control; the new interurban cars with GE-265 Motors and K-Control.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

McGraw-Hill Company, Inc. August 2, 1924 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

Carey Elastite
NAME REG U.S. Patent Office

RAIL FILLER

is a specially-tempered asphalt composition which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail vibration, and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Prompt shipment can be made anywhere in the United States.

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The end of experiment!

AT LAST! a perfected rail filler practical from every standpoint of efficiency and price.

Street-railway and city engineers are only too well acquainted with the effects of track vibration on the adjacent paving. Loosening and displacement of paving blocks, and eventual failure of the entire pavement and track-structure cause a tremendous expense to both the street railway and the city in annual repairs. Absorb this destructive vibration and you save the track-zone and the rest of the street as well.

The best way to absorb this rail vibration is to interpose an elastic, resilient cushion between the rail and the first course of paving material.

In Carey Elastite Rail Filler we have produced such a material. As a result of the recent development of special processes and equipment we are in a position to economically and simply manufacture Elastite Rail Filler *in any quantity to fit any rail section.*

Write us for sample, information and prices. Please give weight, section, number and name of rail manufacturer, or send blue print of rail cross section.

The Philip Carey Company
53 Wayne Ave., Lockland, Cincinnati, O.

Now's The Time

Form 7385-A

MEMORANDUM

TICKLER FILE
BRING UP 8/1 1924

MR. Jones

DATED June 20 1924

Please check progress on new snow plows. Also, do not forget that new motors and HL control are required for these plows. We must not start another winter as unprepared to meet severe conditions as we did last winter.

GENERAL MANAGER

Follow Up

W
WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all Principal Cities of
the United States & Foreign Countries

Westinghouse

Vol. 64, *No.* 5 New York, August 2, 1924 *Pages* 151-188

ELECTRIC RAILWAY JOURNAL

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Associate Editor

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

"I Had to Go No Further"

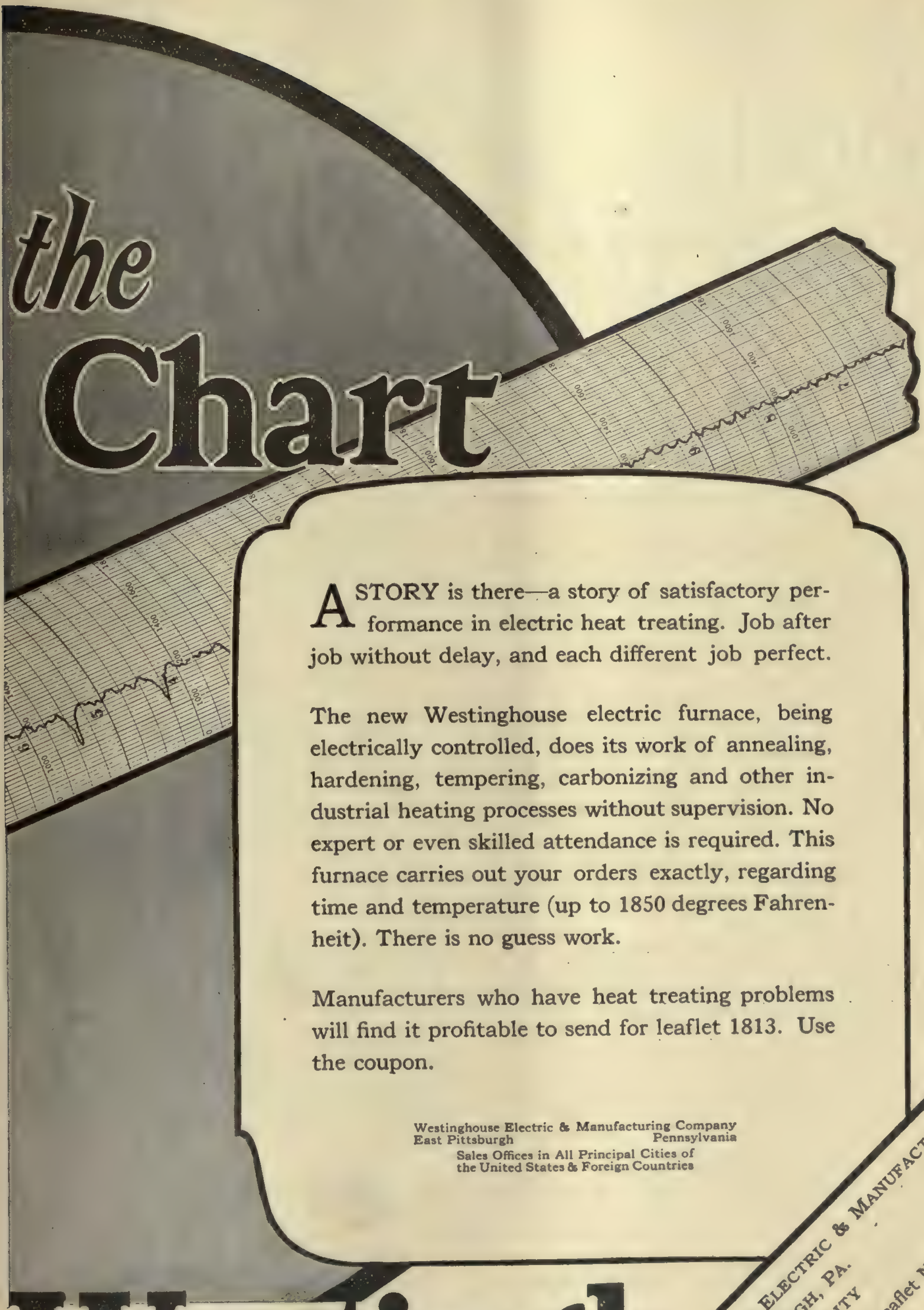
"THE committee would not take no for an answer, and insisted that I prepare a paper on the subject whether or not our property had any actual experience with that particular form of operation," said a railway executive in a discussion with one of our editors.

"I was rather at a loss to know how to obtain enough information to make the paper of real value to a group of railway men, some of whom had had actual experience in the operating subject under consideration. I decided to consult my back files of the ELECTRIC RAILWAY JOURNAL, to see what operating data I could find available there. To my great relief, I found a complete description and discussion of practically all the important phases of the subject, including detailed cost data. I had to go no further in my search. When I got through digesting the immense amount of information available in the JOURNAL, I had plenty of material to prepare a paper that represented quite a complete analysis of my subject."

This is only a single example to illustrate the value of the JOURNAL when information is desired on a problem connected with the operation of electric railways. The incident has a broader significance than the mere fact that this information was supplied when it was needed. Nothing has been said about the particular subject on which this paper was to be prepared. As a matter of fact it wouldn't have made a great deal of difference—as long as it was a subject of interest to electric railway men—the result would have been the same.

Number of Copies Printed, 6,150 Advertising Index—Alphabetical, 52; Classified, 48, 50; Searchlight Section, 47

Read
WESTINGHOUSE ELECTRIC
Westinghouse



the Chart

A STORY is there—a story of satisfactory performance in electric heat treating. Job after job without delay, and each different job perfect.

The new Westinghouse electric furnace, being electrically controlled, does its work of annealing, hardening, tempering, carbonizing and other industrial heating processes without supervision. No expert or even skilled attendance is required. This furnace carries out your orders exactly, regarding time and temperature (up to 1850 degrees Fahrenheit). There is no guess work.

Manufacturers who have heat treating problems will find it profitable to send for leaflet 1813. Use the coupon.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States & Foreign Countries

Westingh

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH, PA.
DEPT. OF PUBLICITY
Please send leaflet No. 1813
Name..
Address..

C

Good instruction

The Eastern Massachusetts Street Railway conducts a course on track maintenance. Here are some extracts from their printed syllabus:

"**Joint Repairs.**

18. Track should be inspected at frequent intervals by the section foreman.

19. Do not let your repairs go for too long a time. What may be a small job today, may develop into being an expensive one in a very short while.

"**Derailments and Split Switches.**

(a) *Causes:—*

1. Defective track, bad joints, line, surface, gauge not enough elevation on curves * * *

(b) *Prevention:—*

1. Track must be inspected at frequent and regular intervals and defects reported and immediately repaired.
2. All special work must be thoroughly inspected at frequent and regular intervals, defects repaired at once."

Good instruction, good engineering, good business. Application of such principles leads to rail grinding and welding equipment such as we show here.

Printed details are ready for you.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

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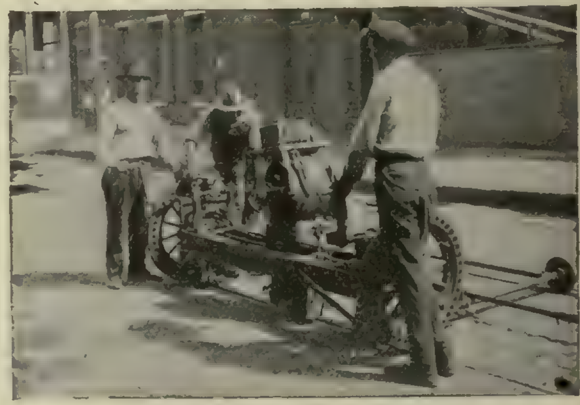
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

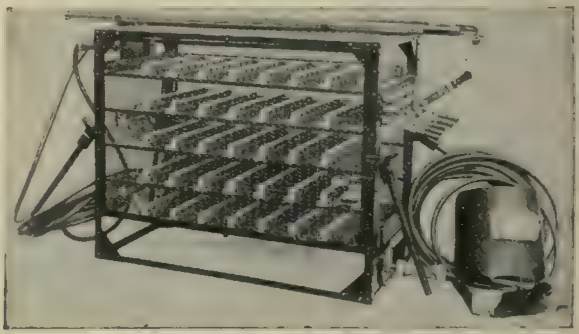
(264)

"Reciprocating" Track Grinder


"Universal" Rotary Track Grinder

"Atlas" Rail Grinder

"Hercules" Swing Frame Rail Grinder


"Ajax" Electric Arc Welder

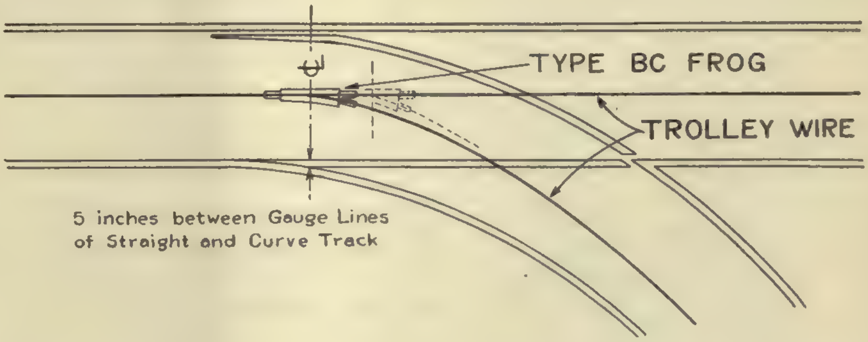
Why the BC Frog Saves Wear on Trolley Wire and Wheel

O-B Bronze Cam Tip

This is the O-B Bronze Cam Tip provided on the BC Frog as well as other O-B trolley fittings. It has a 6-inch approach that carries the wheel onto pan without abrupt changes or bumps.

The runners on the BC Frog are formed up to the center of the pan and the center points overlap as shown in the cut at bottom of the page. The Frog can be located farther out of the curve and consequently the trolley wheel will follow a turnout with less angle of drag.

This saves wear on both the trolley wheel and the trolley wire, and still insures a positive operation onto the turnout track, without affecting correct passage of wheel on straight track.

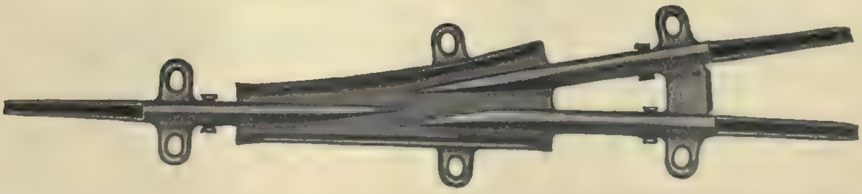


This figure illustrates how the O-B Type BC Frog is located. The frog is close to the switch points, considerably more so than the average frog construction would permit. The wheel follows easily onto turnout wire. The drag, or distance the wheel must ride at an angle on the main line before entering the turnout, or on turnout wire when the car is coming onto the straight track, is greatly reduced. The wear on the trolley wire, wheel and frog is less and their life materially longer.

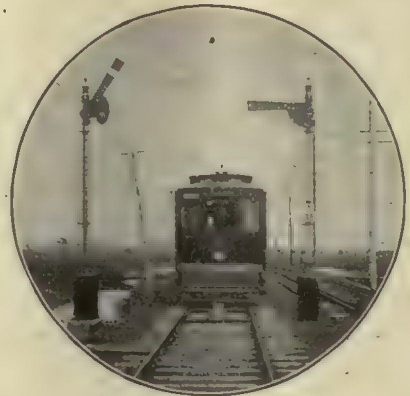
The BC Frog is always more in alignment with the trolley wheel. It permits shifting of trolley wire towards inside rail on curve without abrupt bend. This brings the wire more in line with the natural position of the trolley pole and wheel which lean due to outer rail elevation.

Put up a BC for a Service Trial

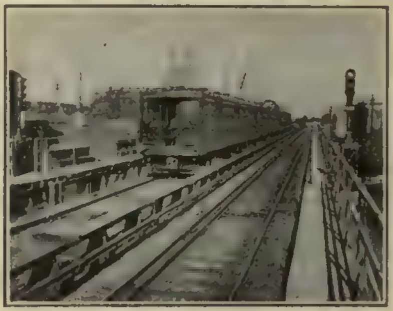
The Ohio Brass Co.
Mansfield, Ohio, U.S.A.
TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS
NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE
Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada



Illinois Traction Company

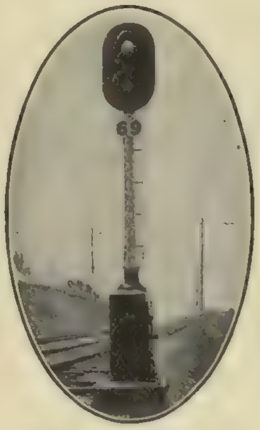


Public Service Railroad
of New Jersey



Philadelphia Rapid Transit
Company

Chicago, Milwaukee &
St. Paul Railway



Washington, Baltimore &
Annapolis Electric Railroad

Kansas City, Clay County
& St. Joseph Railway

Public Confidence

IS ASSURED to Railways equipped with Union Automatic Block Signaling Systems. Return on the investment is secured by the direct and indirect savings produced.

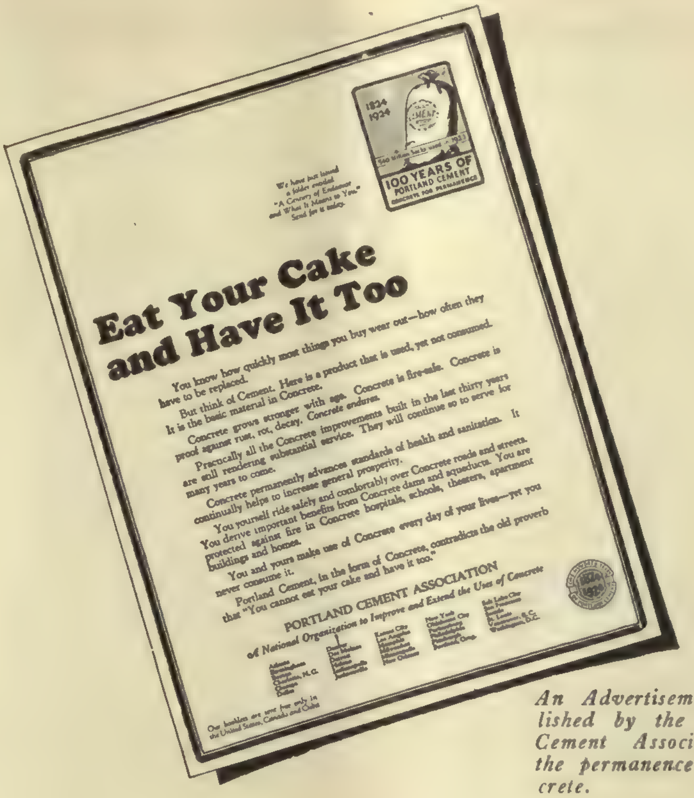
To be Complete—Safe, a signaling system must be based upon the sound principles of the Continuous Track Circuit, or in other words, a means must be provided whereby each car or train is responsible by its mere presence *anywhere* in the block or spacing section to *continuously* maintain one or more opposing stop signals in front of it as well as a stop signal behind it.

Local conditions govern each installation. Let one of our Engineers show you the benefits which Signals will produce for your Railway.

Union Switch & Signal Co.

SWISSVALE, PA.

TRADE MARK



1824
1924

100 YEARS OF PORTLAND CEMENT
CONCRETE FOR PERMANENCE

We have just issued
a folder entitled
"A Century of Endeavor
and What It Means to You."
Send for it today.

Eat Your Cake and Have It Too

You know how quickly most things you buy wear out—how often they have to be replaced.

But think of Cement. Here is a product that is used, yet not consumed. It is the basic material in Concrete.

Concrete grows stronger with age. Concrete is fire-safe. Concrete is proof against rust, rot, decay. *Concrete endures.*

Practically all the Concrete improvements built in the last thirty years are still rendering substantial service. They will continue so to serve for many years to come.

Concrete permanently advances standards of health and sanitation. It continually helps to increase general prosperity.

You yourself ride safely and comfortably over Concrete roads and streets. You derive important benefits from Concrete dams and aqueducts. You are protected against fire in Concrete hospitals, schools, theaters, apartment buildings and homes.

You and yours make use of Concrete every day of your lives—yet you never consume it.

Portland Cement, in the form of Concrete, contradicts the old proverb that "You cannot eat your cake and have it too."

PORTLAND CEMENT ASSOCIATION
A National Organization to Improve and Extend the Uses of Concrete

Our booklets are sent free only in the United States, Canada and Cuba

An Advertisement Published by the Portland Cement Association on the permanence of Concrete.

Use Your Track and Have It Too

THE renewal of Steel Twin Tie Track at the end of the wearing life of the rail is based on the application of simple and practical track methods to the fact brought out in the Portland Cement Association advertisement shown above — that *concrete endures.*

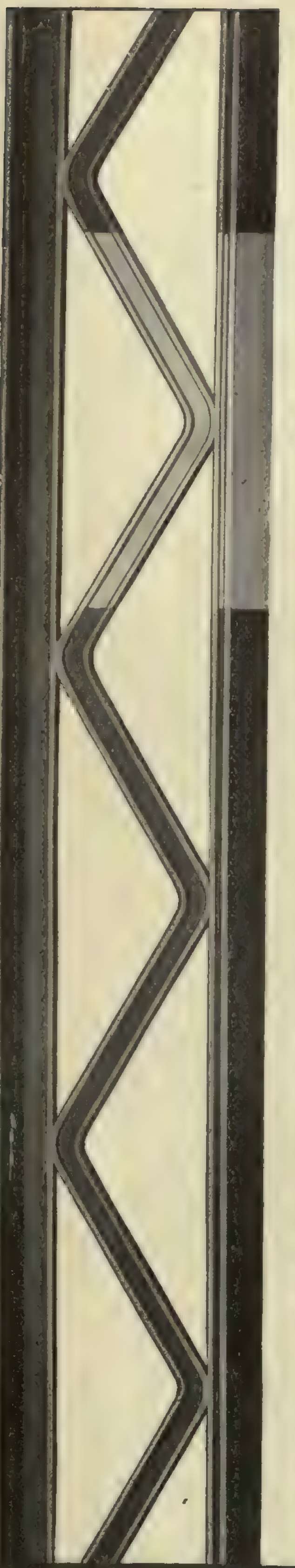
The permanence of concrete and steel; the simplicity, convenience and strength of arc seam welding; the simple fact that there are excellent rails for Paved Track 6 inches high make possible new economies in the cost of paved track which should be considered in planning your mid-season construction.

Write today for complete information on Steel Twin Ties and the renewal of Steel Twin Tie Track.

The International Steel Tie Co., Cleveland, Ohio

Steel Twin Tie Track

Economical — Permanent — Renewable



Bates Poles on Electric Railway in Coruna, Spain

Bates Poles with specially designed trolley supports are used along the right of way of the Compania de Travias de la Coruna at Coruna, Spain.

A perfect truss made from one piece of steel, without rivets, bolts or wheels, Bates Poles have remarkable strength and give sturdy service. Mass production makes them economical in first cost, their simplicity makes them easy of maintenance.

Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

Next stop–please!

This is the right idea in service and accomodation of passengers! Don't carry them past their streets. A crowded car is no place in which to make the passenger hunt for the conductor to signal a stop.

No. 19403
Buzzer

FARADAY
CAR SIGNAL SYSTEMS

Type A
Push Button

do the trick and do it right. From any point in the car, no matter how crowded, no matter how noisy, a direct, clean and positive signal to the motorman, is at every passenger's hand.

Buzzers, single stroke bells and push buttons of various styles are available in high or low voltage types.

Type B
Push Button

Specify "Faraday System"

ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.
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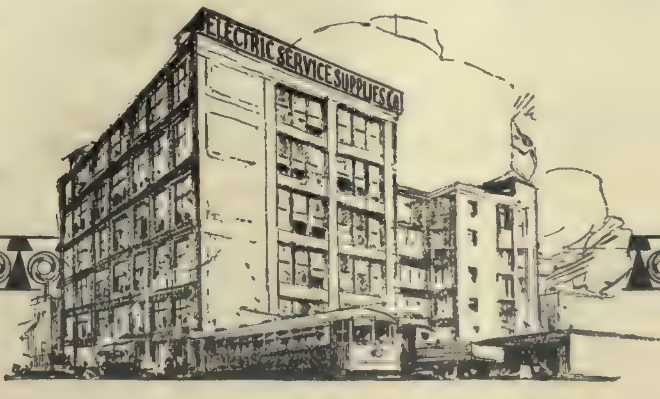
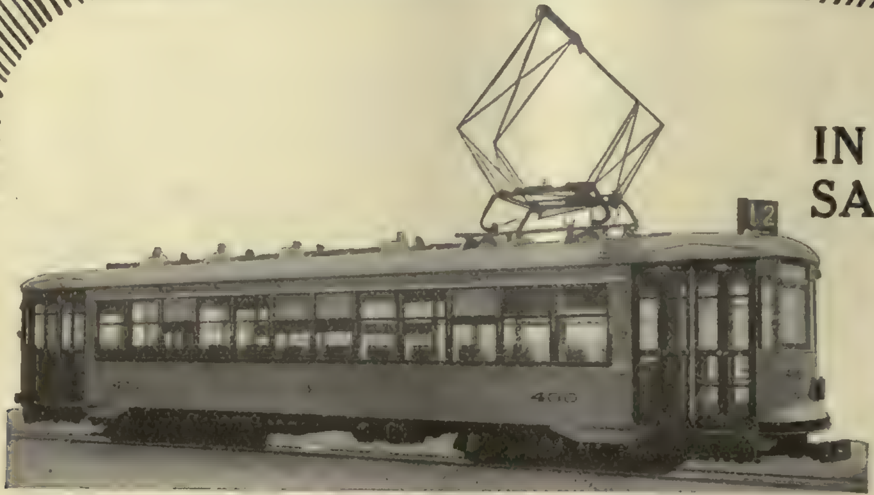
829 Oliver Building

NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver


ELECTRIC SERVICE SUPPLIES CO.



IN SAN DIEGO

Fifty new light-weight, high-speed interurban cars of the type illustrated here have been placed in service on the recently completed San Diego-La Jolla line of the San Diego Electric Railway Co. These cars are equipped with Westinghouse AMU Brakes and Westinghouse DH-25 Air Compressors.

DH COMPRESSORS

You can apply Westinghouse DH Air Compressors to your cars with complete assurance that you are definitely settling the air compressor problem for many years to come. Satisfactory service under every condition; dependability coupled with durability; positive lubrication; compact, low-height design—these features have made the DH Compressor the favorite everywhere among railway operating men. Built in three sizes, 10, 16 and 25 cu.ft. piston displacement.

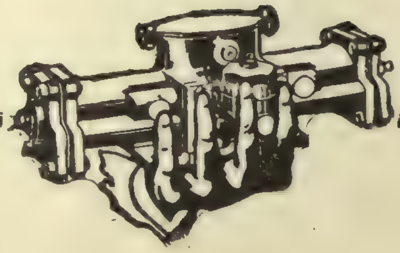
DH
Compressor

COMPLETE
AIR BRAKE
EQUIPMENT
for EVERY CLASS
of
SERVICE

WESTINGHOUSE TRACTION BRAKE CO.

General Office and Works: WILMERDING, PA.

WESTINGHOUSE TRACTION BRAKES



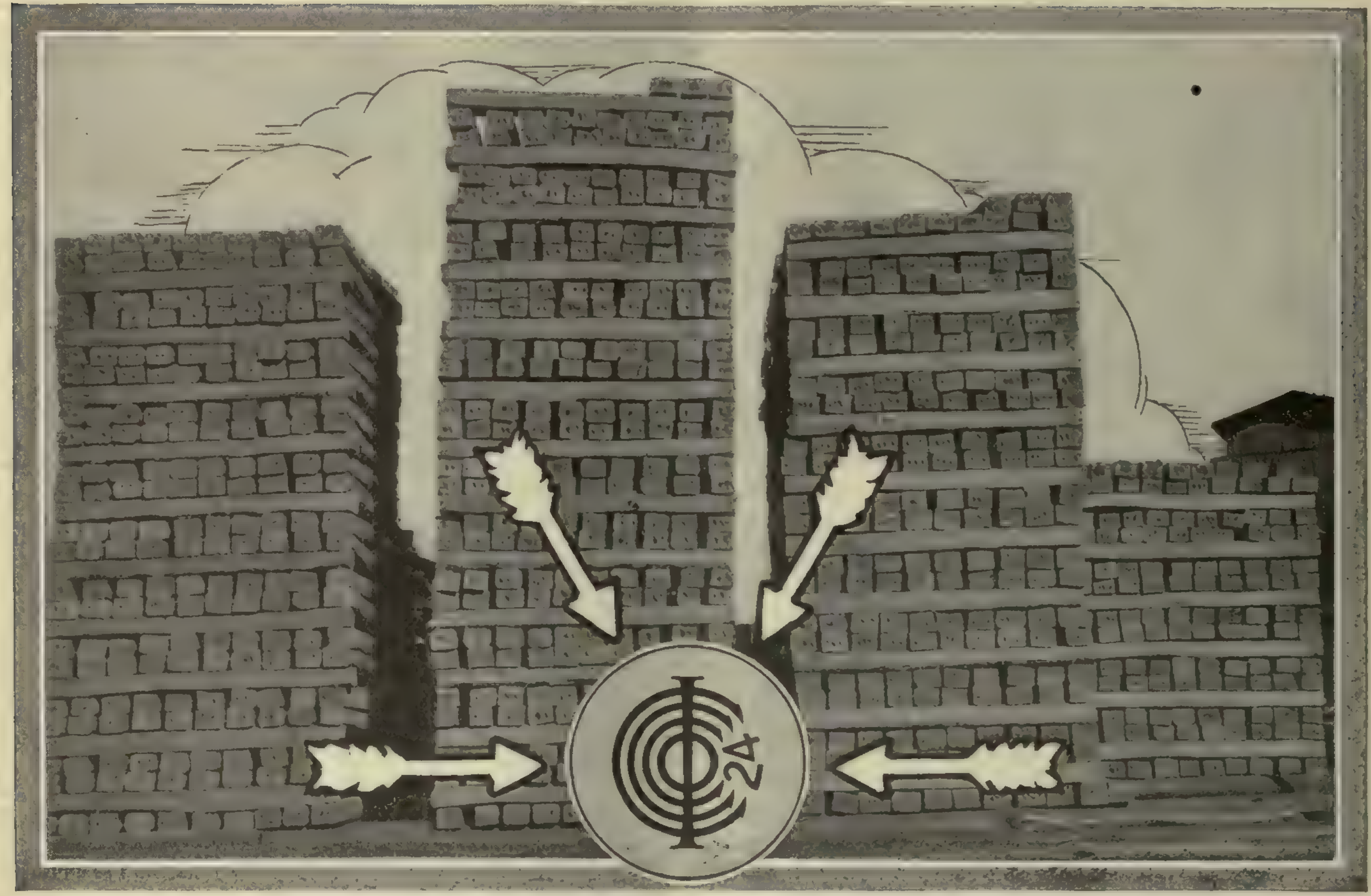
Inexpensive to maintain
if it is
NATIONAL PNEUMATIC EQUIPMENT

STRONG, rigid of construction, pared of all surplus weight and simplified to a point of practical perfection, National Pneumatic Door Engines operate month in and month out without attention. Their non-adjustable reserve cushion arrangement is made right in the first place and thereafter needs no attention.

The details are in this big illustrated Catalog—free on request.

Door Engines
Door and Step Control
Operating Mechanisms
Motorman's Signal Lights

NATIONAL PNEUMATIC CO., Inc.
Originators and Manufacturers
***Principal Office:* 50 Church Street, New York**
Philadelphia—Colonial Trust Building Chicago—McCormick Building
Works—Rahway, New Jersey
Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.



Note the uniformity of these Grade 2 and 3 ties and how carefully they are stacked high from the ground on creosoted poles.

The 18 Karat Mark on Ties

THE railroad that is burdened with the expense of decayed, over-graded, or inferior ties should try ***International*** Tie Service. This service eliminates the uncertainty of tie buying, for ***International*** Tie Service is confined to the sale and delivery of sound, full size, Standard Specification Ties, marked with the ***International*** dating nail — the 18 Karat Mark of Tie Quality placed in every tie.

This dating nail not only insures protection to your investment at the time of initial purchase of ties, but results in a saving in track maintenance due to longer tie life and fewer tie renewals, either of which is big enough and positive enough to command your thorough investigation.

Contract with International now—the future will thus be assured.

International Creosoting & Construction Co.
General Office—Galveston, Texas
Plants Texarkana, Texas Beaumont, Texas Galveston, Texas

International

Standard Specification Ties

The Field for Double-Deckers

While limited largely to metropolitan service, double-deck Fifth Avenue Buses, because of the minimum amount of street space occupied per seated passenger, are the most practical multiple automotive all year round carriers on the market today. Our 2-L type buses provide seats for sixty-four passengers, which is more than the seating capacity of the average street railway car. This has been accomplished without unduly lengthening the wheel base of the bus.

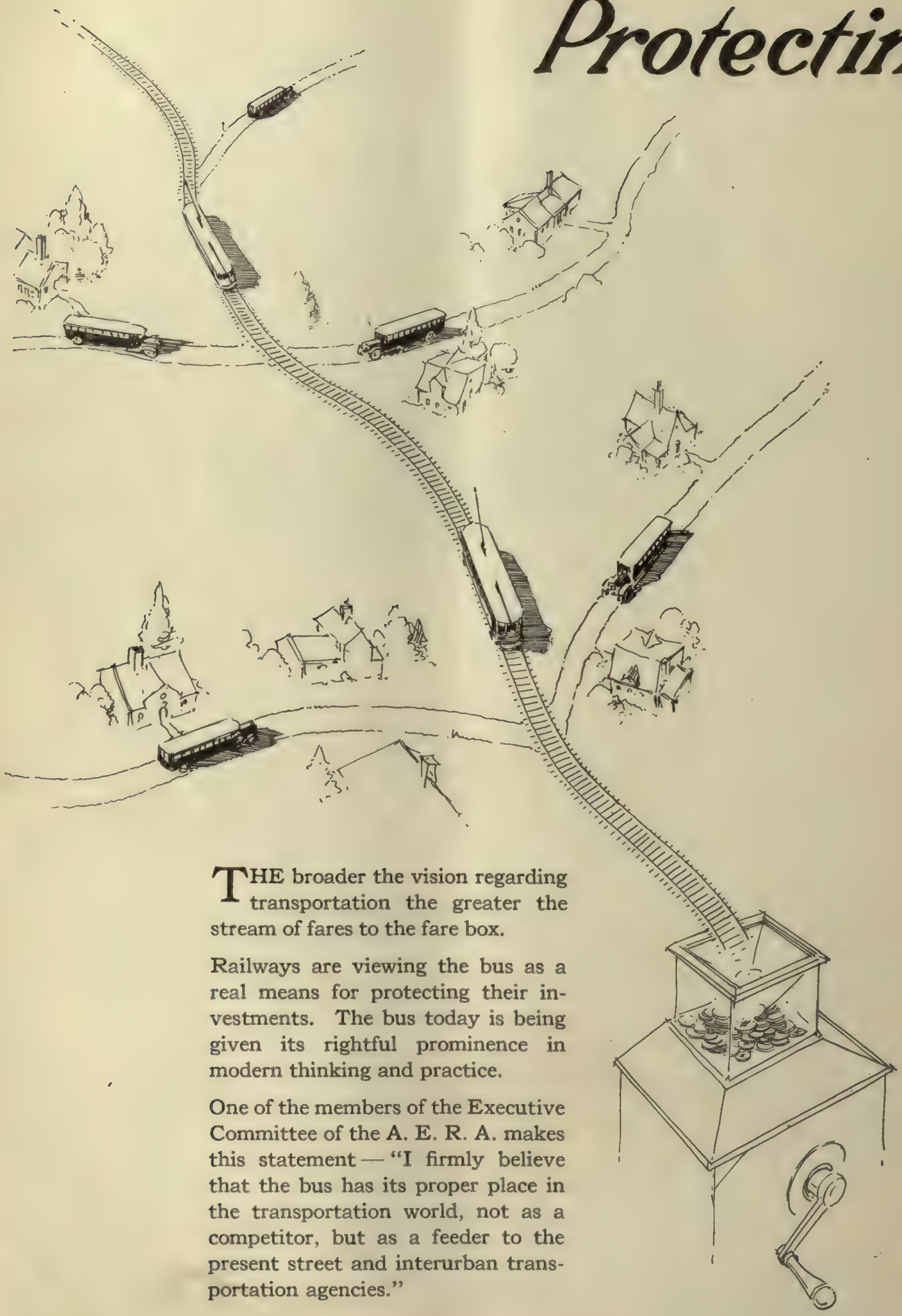
The appeal of the upper deck is beyond question. It has established its place in the transportation panorama. It is not an innovation or a fad, developed to meet a contemporary demand. Double-deck buses have come to stay. They have passed the experimental stage. Enclosure of the upper deck, either by a permanent top or by our new adjustable all-weather top, has made available the entire seating capacity every day in the year, without sacrificing the attraction of the open-air ride in summer. The overall height of enclosed double-deck bus is a trifle less than fourteen feet.

Mechanically efficient, comparatively inexpensive to maintain and possessing an unquestionable appeal to the riding public, Fifth Avenue Bus equipment measures up to the requirements of the most exacting street railway men.

Send for booklet
"A Fifth Avenue Transportation System for Any Community"

NEW YORK TRANSPORTATION CO.
New York, N.Y.

Protecting



THE broader the vision regarding transportation the greater the stream of fares to the fare box.

Railways are viewing the bus as a real means for protecting their investments. The bus today is being given its rightful prominence in modern thinking and practice.

One of the members of the Executive Committee of the A. E. R. A. makes this statement—"I firmly believe that the bus has its proper place in the transportation world, not as a competitor, but as a feeder to the present street and interurban transportation agencies."

Railway Investments!

IN a statement made by a large railway company regarding bus operation the following views are openly expressed—

"We feel that the manufacturers are doing an injustice to the type of equipment now coming into extensive use when they refer to it as a 'bus.' When one refers to a 'bus' the first impression is of an old, narrow, side-seated rattley affair, such as used to meet all railroad trains. The beautiful, comfortable, modern equipment now being put into service is entitled to a more dignified name .. . . . "

Mack buses fit these specifications to the letter.

Known by the trade name "bus," they are actually commodious passenger coaches, designed and built from bumper to tail light to meet bus operating conditions.

Mack buses are not merely bodies perched on a truck chassis. The design begins with the bus chassis as a basis, and into every Mack bus is built specialized bus requirements to meet a passenger carrying type of service.

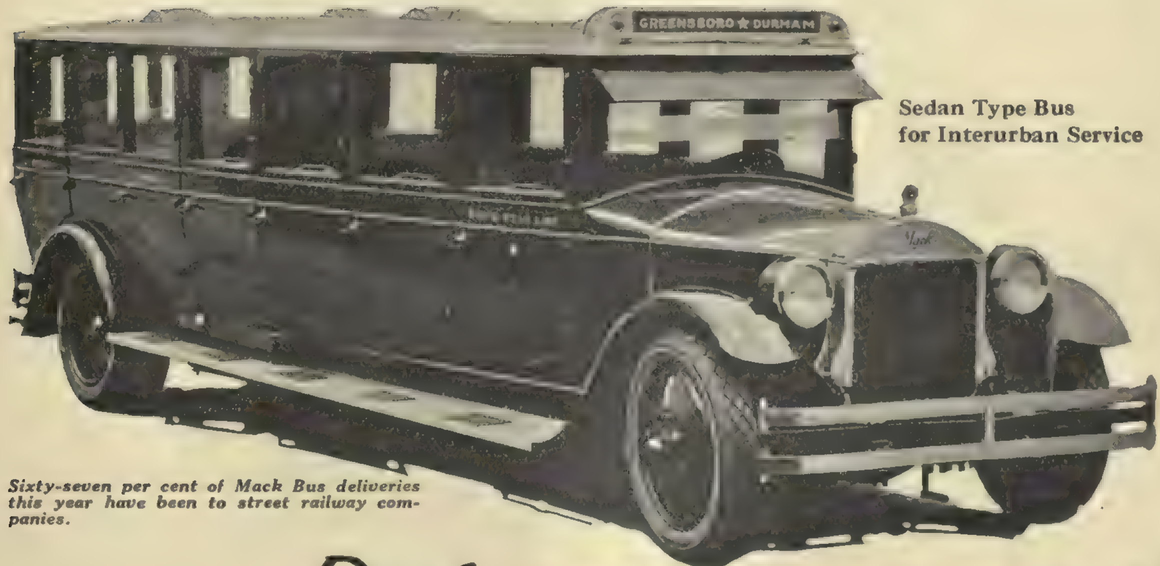
And this 100 per cent bus design is backed by schedule-maintaining service — a builder of passenger confidence and a source of economy to owners.

The Mack bus is *all bus.*

MACK TRUCKS, INC.
INTERNATIONAL MOTOR CO.
25 Broadway, New York City
Builders of City and Sedan Type Buses

[The 85 Branches owned by this company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK INTERNATIONAL MOTOR TRUCK CORPORATION."]

The Mack Bus



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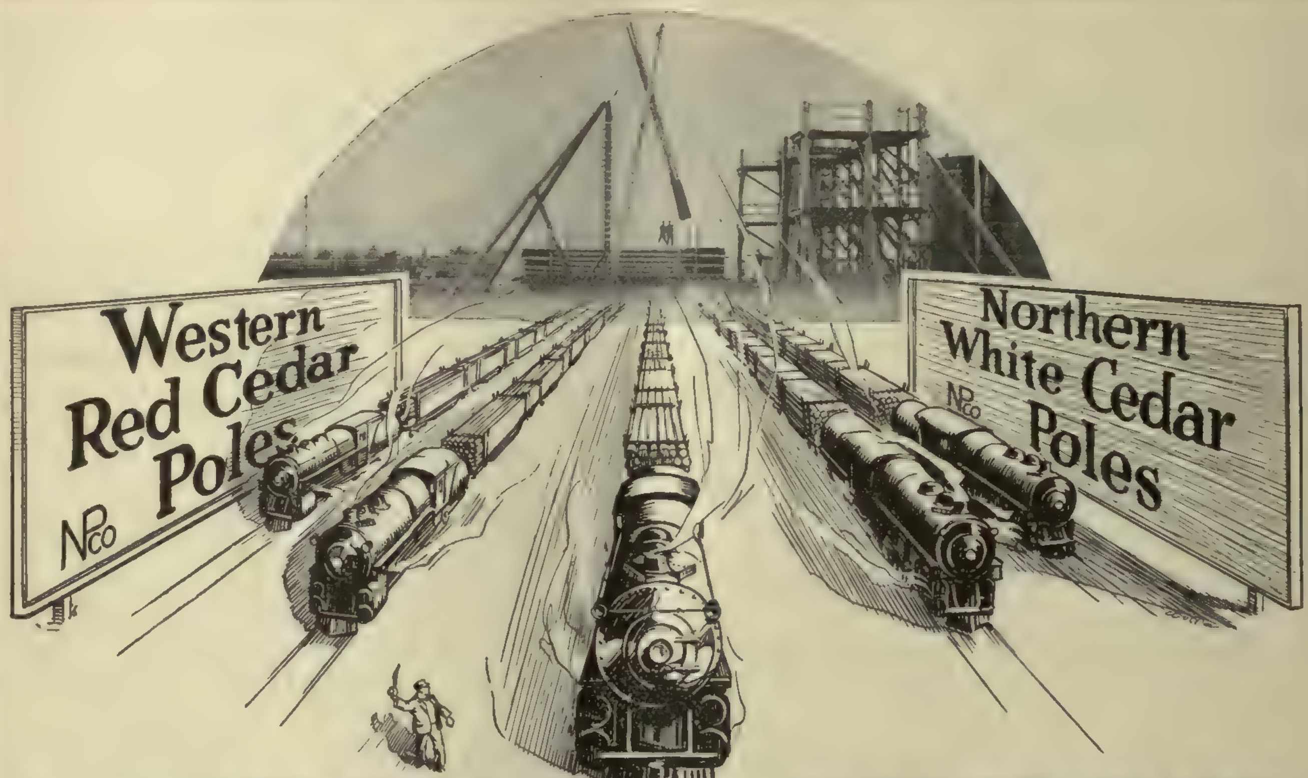

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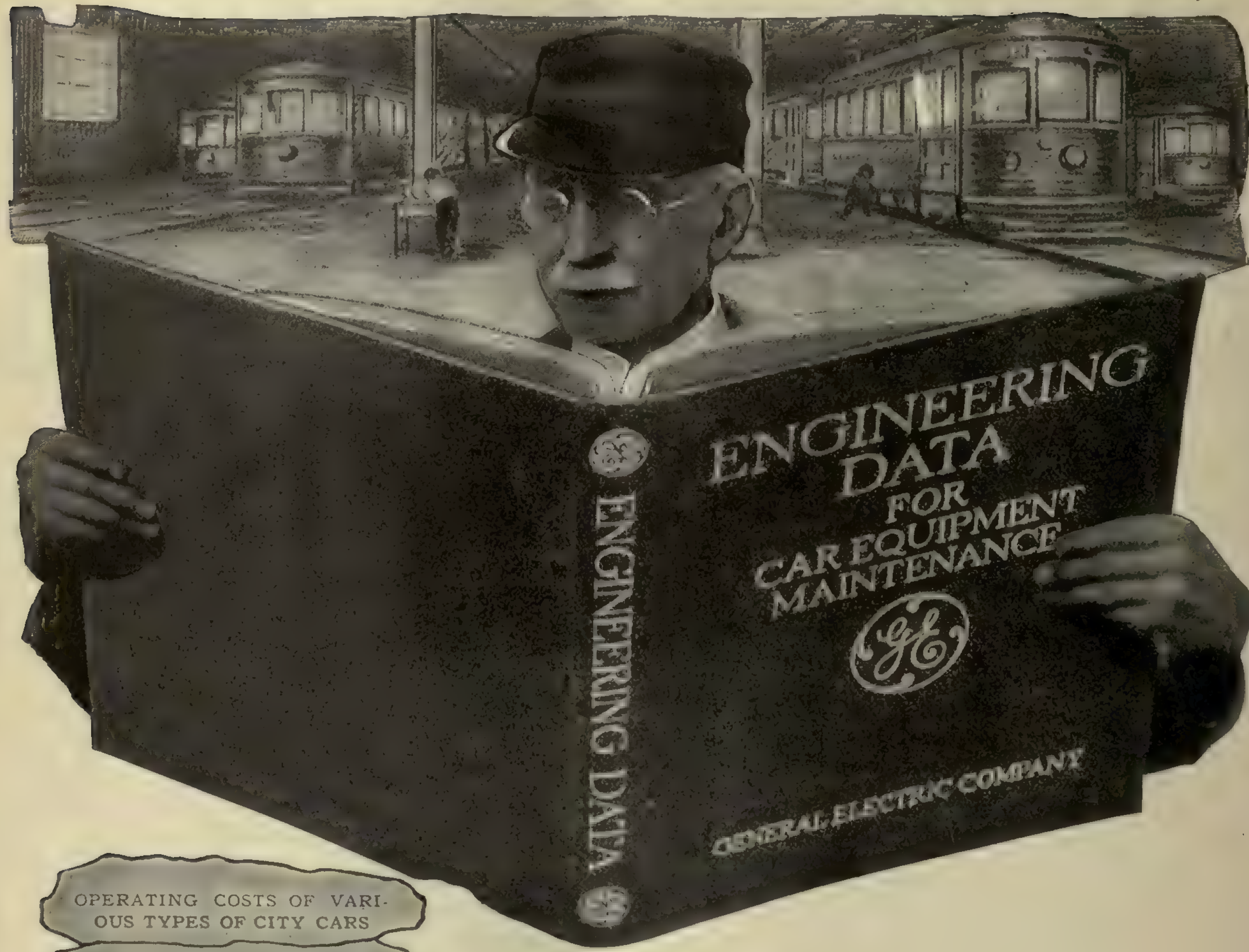
QUALITY-SERVICE-ECONOMY G O S GALENA OILS


ENGINEERING DATA FOR CAR EQUIPMENT MAINTENANCE
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ENGINEERING DATA

OPERATING COSTS OF VARIOUS TYPES OF CITY CARS

Caring for D-C. Aluminum Car Arresters During the Winter

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Methods of Removing the Armature from Box-frame Railway Motors

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GENERAL ELECTRIC

New York, August 2, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and Harry L. Brown, *Editors*

Volume 64
Number 5

Co-ordinated Effort Furthers Modernized Freight-Handling Program

MODERNIZATION in facilities for handling freight by electric railways took a long step forward with the completion of the new consolidated freight terminal in Indianapolis, which is described in this week's issue of ELECTRIC RAILWAY JOURNAL. This terminal represents the results which can be accomplished by co-operative effort on the part of the electric railways entering an important community. The improved facilities will allow the roads entering this terminal to handle shipments with more dispatch and at a lower cost.

Lack of proper terminal facilities has been one of the factors which have received most careful consideration by those roads which have been endeavoring to increase their freight business. A consolidated terminal, furnishing facilities for the various electric railways entering a given community, would offer a solution in many other cities where conditions are comparable with Indianapolis.

A terminal of this kind offers the opportunity for favorable financing. In the case of the Indianapolis development, the combination of several railways made possible a separate terminal company which issued securities, which were sold readily on favorable terms to cover the cost of the buildings and grounds. It is to be hoped that the example of the Indianapolis roads will inspire others similarly situated to consolidate their efforts. The result will be twofold; first, in increasing terminal facilities, thereby increasing the speed and reducing the cost of handling shipments, and, second, in raising, in the eyes of shippers, the general status of electric railways as freight carriers.

Joint Interurban Tariffs Needed to Get Business

THE need for establishing a joint class rate freight tariff over all connecting electric railway lines, to be issued by the Central Electric Traffic Association, becomes more apparent with the completion of the new consolidated freight terminal in Indianapolis, which was described in the article referred to above.

The success with which such tariffs have been put into effect for passenger traffic over the lines in the central interurban territory, comprising the roads in Indiana, Ohio and Michigan, serves to emphasize the lack of published joint freight tariffs in even this progressive interurban district.

Shipment of freight is a profitable source of revenue for electric roads. This has been repeatedly demonstrated. The lack of joint tariffs is a serious obstacle to the normal growth of this business, while, on the contrary, establishment of such tariffs will stimulate its general development.

In many industries the advantages of co-operative effort have been repeatedly demonstrated. The electric railway business is no exception. In addition, a shipper will be far more interested in the possibilities of shipping to various points on an extensive network of lines covered by a joint tariff than in the facilities offered by any one of the lines individually.

For a number of years most of the electric railways in this territory have issued joint freight tariffs, naming class rates to points on other lines, but in many instances rates are not the same in the opposite direction. This results in more or less discrimination. Furthermore, when a large distributing concern located in such a center as Detroit, Louisville, Columbus, Cleveland or Indianapolis wishes to obtain rates on inbound traffic it must secure the individual tariffs from some 20 or 30 roads, with rates compiled in various ways and often on different bases.

A joint class rate tariff issued by the Traffic Association would be a great help in placing through electric railway freight service before the shipper to its best advantage. The publication of such a tariff, while slightly greater in cost than the present individual publications of the lines, would be worth many times the price. The plan, which has been recommended by the Central Electric Traffic Association, certainly deserves the support of all the interested roads.

Protecting Passengers' Eyes from Injurious Glare

GOOD car illumination pays and it is worth while for a railway to spend money to secure it. Although the duration of the exposure is shorter the eyes of the street car riders should if possible be as carefully protected from injurious glare as are the eyes of a man working in a factory. This danger, of course, did not exist to any great extent when carbon filament lamps were used. But with the substitution of bare tungsten filament lamps the situation was altered, and the need of improved lighting is becoming more widely appreciated.

Authorities on optical hygiene agree that the human eye cannot be exposed to light sources much brighter than 5 candlepower per square inch without strain and perhaps permanent injury, if the exposure is prolonged. This is about the brightness of a clear sky, at which no one cares to look for any continuous period. Since the brightness of a bare lamp filament is on the order of 1,000 cp. per square inch, it is obvious that some shade or diffusing accessory is desirable.

It has been suggested several times lately that frosted lamps be used in place of the clear glass lamps, as it is claimed that frosted lamps are more artistic in appearance and easier on the eyes of the passengers. There is undoubtedly a certain amount of truth in this contention, because the lights in a street car are more or less in the line of vision of the passengers, but there is also something to be said on the other side of the question. In the first place, the actual amount of illumination furnished by a lamp with a frosted bulb when new is about 7 per cent less than that furnished by the same lamp with a clear glass bulb.

Frosting would cost an additional 5 cents per lamp. The expense resulting from the adoption of such a plan would be a continuing one. Not only would it cost more so to equip a car in the beginning, but every lamp for replacement would be more expensive than a clear glass lamp. Moreover, frosted lamps deteriorate more quickly than those of the ordinary type because the rough surface collects dirt more quickly and is harder to clean than a smooth surface.

Considering the total number of lamps replaced for one reason or another, during the course of a year, the additional cost of using frosted lamps would be practically prohibitive. The money which it would take to make this change might better be spent in other ways to make the cars more comfortable and attractive as, for example, by installing shades or reflectors to direct the light from clear lamps properly, so that adequate illumination without glare is accomplished.

The bowl enameled or frosted type C Mazda lamp has a brightness of about 15 cp. per square inch and the clear lamp in the average diffusing globe, for example a 75-watt in an 8-in. diameter globe, has a brightness of about 3.6.

Strange as it may seem, the bowl frosting or bowl enameling of the lamp bulb increases the downward candlepower, even though the total light output be reduced. About 20 per cent absorption loss may occur in the average diffusing glass globe, although the useful light, i.e., that in the lower hemisphere, may be only a very few per cent less when using the diffusing globe than when using the clear lamp. As regards lighting efficiency, there is not much difference between the clear lamp in the glass globe and the frosted lamp in the enameled metal reflector. Perhaps the final solution will not be the use of the bare or frosted lamp bulb, but will be the clear lamp bulb in the deep and protecting metal or glass reflector.

Cheap Taxicab Fares and the Electric Railways

AS THE result of a price war between different operating companies, many taxicabs in New York City have now reduced their fares to a so-called rate of 20 cents a mile, although in practice this means 27 cents for the first mile and 20 cents for the second and succeeding miles. With the advent of such cheap taxicab fares some of the old familiar prophets of evil have again envisaged the doom of the electric railway. Experienced transportation men are not much alarmed by this prospect, however.

It seems rather doubtful whether a cab rate of 20 cents per mile can be maintained with reasonable profit to the operator. A private automobile of average size costs 10 cents per mile or more to operate, without including interest on the investment or driver's wages. If these items are added we have a total well over 15 cents per mile. Obviously a taxicab cannot always be carrying passengers. There will be many occasions when the vehicle is returning empty from a trip or "cruising" in search of a fare. If three-quarters of the total mileage operated were revenue mileage, which seems a liberal allowance, the income would be 15 cents a mile, or less than the expenses.

Regardless of whether or not the taxicab owners can make a living by charging 20 cents a mile, the electric railway retains its economic superiority by a wide margin. Five passengers, a capacity load for a taxicab, costing, let us say, 15 cents a mile to operate, travel at a cost of 3 cents per passenger-mile. Forty passengers in a street car, costing 30 cents a mile to operate, ride at a cost of ¾ of a cent per passenger mile. In the end economic laws will determine the outcome. Visionaries may be able to picture the taxicab tackling the job of mass transportation, but sensible people don't want to see the rails torn up just yet.

Is There Any Way to Stop "Man Failure"?

THE disastrous accident on the Long Island Railroad electric division, occurring on Wednesday of this week, was evidently a case of "man failure." An attempt will undoubtedly be made at the hearing on this accident to get from the assistant engineer the reason which led him to throw a track switch before a loaded electric train had completely cleared it. But probably he had no reason. He was thinking of something else. The case is not unlike that which recently happened on a trolley line where an operator in broad daylight deliberately ran into another car, although in that case the damage caused was slight except to the cars involved. The man had a good record. A visit to his home by a welfare worker immediately following the accident showed no family troubles or financial difficulties, though a later more thorough investigation showed that the night before he had had no sleep because of a sick child. Obviously, there is more to the prevention of accidents than the question of whether employees are in good physical condition and can pass intelligence tests when they are engaged.

This is the problem which modern industrial psychologists are attempting to solve. Psychology, which is the science of the mind, is one of the oldest branches of learning, but it is only within the last few years that an extended attempt has been made to apply the science to industrial problems. The first extended application to the electric railway field, in this country at least, was made about twelve years ago, largely at the instance of Martin J. Insull, now president of the Middle West Utilities Company. Then, as now, the properties under Mr. Insull's direction included some electric railway lines, and several instances of man failure on these lines impressed him deeply. Assisted by General Bancroft, then president of the Boston Elevated Railway, he induced Professor Münsterberg to conduct some tests at Harvard University to determine the mental qualities desirable in motormen. These experiments ceased with the beginning of the war and have not been resumed by electric railways.

During the war the application of the principles of psychology to the choice of men for responsible positions received a great stimulus because of their application to the choice of army officers. It is also known that foreign electric railway companies have pursued the study of this matter in a much more extended way than has been done in this country. It is planned that in an early issue an account of the methods followed in Paris will be published in this paper.

The Flush Platform Facilitates Loading and Unloading of Cars at the New Indianapolis Freight Terminal

Indianapolis Has Largest Electric Railway Freight Terminal in World

Four Interurban Roads Entering City Have Joined in This Large Terminal Development to Meet the Need of Expanding Freight Business—The Design Facilitates Quick Loading and Unloading Both of Cars and Vehicles—Further Extensions Are Planned

TO MEET the requirements of the continually growing electric railway freight business over their lines in the central interurban territory centering in the city of Indianapolis four roads have completed what is probably the largest electric railway freight terminal in the world. These are the Terre Haute, Indianapolis & Eastern Traction Company, the Indianapolis & Cincinnati Traction Company, the Interstate Public Service Company and the Union Traction Company of Indiana. The design of this terminal represents the cumulative experience of 18 years in the use of freight houses in Indianapolis for traction purposes, and also includes ideas developed from careful studies of steam railroad freight buildings as well as interurban freight terminals in other cities. Thomas B. McMath, chief engineer Indianapolis Street Railway Company, was consulting engineer in general charge of the work and T. H. David, principal assistant engineer Indianapolis Street Railway, was the supervising engineer on the terminal. The architect was F. S. Cannon of Indianapolis and the Service Construction Company of that city had the general contract.

An accompanying illustration shows the general layout of the completed terminal. The buildings consist of one structure which had been built previously by one of the companies and a new building 928 ft. long. The tracks form a loop through the property, and as the approach to the yard is over a double-track street railway the layout was designed so that trains can arrive and leave in the proper directions. There is a main vehicle driveway between the two buildings, and in addition team tracks are provided with space for trucks and teams to reach these tracks without congestion.

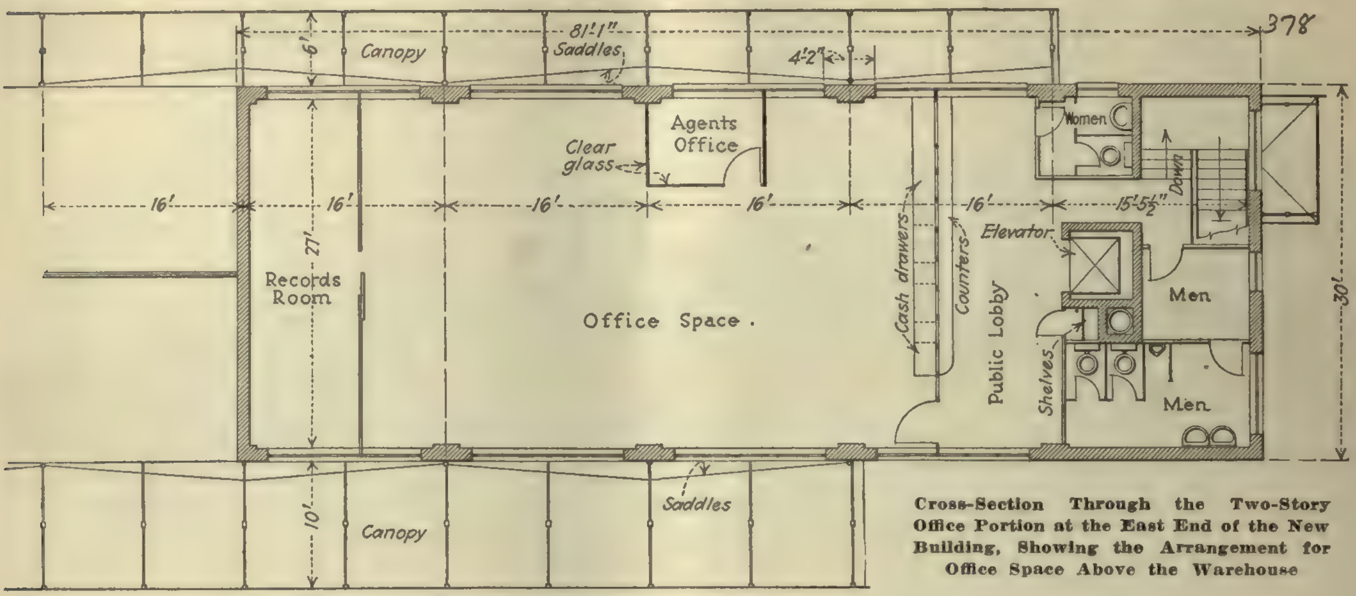
The terminal has been built on ground acquired adjoining the original 400-ft. building, which was completed in January, 1918, by the Terminal Realty Company, whose common stock was owned by the Terre Haute, Indianapolis & Eastern Traction Company. A new holding company, called the Terminal Realty Corporation, and representing the four electric lines concerned, purchased the interest of the T. H., I. & E. in the original development and acquired the necessary land to complete the entire project. The original terminal thus became a unit of the enlarged plan.

Following generally the same type of construction which was used in the original T. H., I. & E. building, the new freight house parallels the original structure and is separated from it by a granite paved driveway 75 ft. wide. South of the new building four tangent tracks, each 832 ft. long, can be reached from the loading dock. A 50-ft. granite paved driveway serves as an exit at the west end of the main drive.

CONSTRUCTION OF BRICK AND CONCRETE

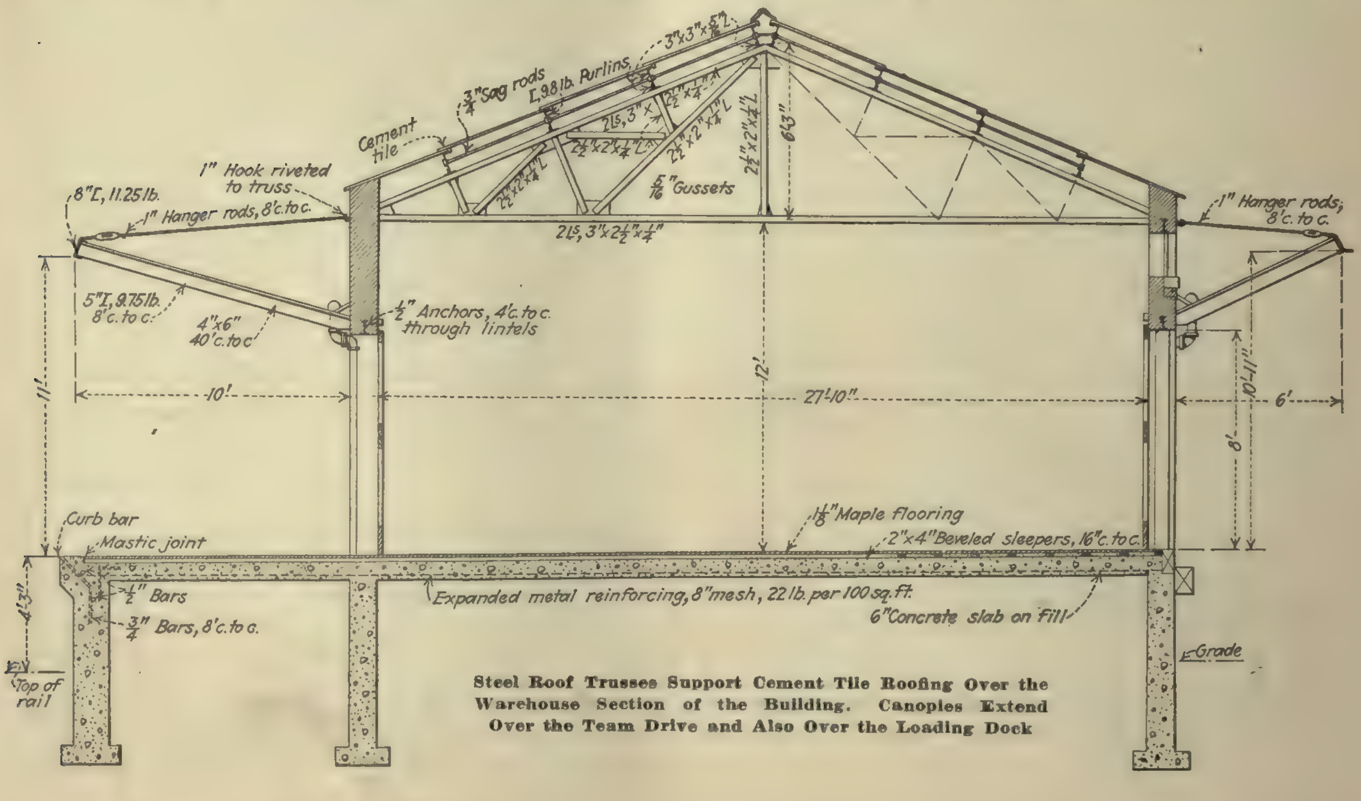
All of the buildings are of brick and concrete foundation and are erected in panels of 16 ft., with a 12-ft. door in practically every panel. These doors are provided on both the truck and vehicle sides of the house. At the Kentucky Avenue end of the new building a two-story section is carried back 80 ft. to give office space on the second floor above the freight house floor. A second two-story section is constructed near the center of the building to provide additional office space.

In the design of the new building, its length was determined by the length of the property. The width of 30 ft. was selected after careful study of this subject. For electric railway purposes, the comparatively



Cross-Section Through the Two-Story Office Portion at the East End of the New Building, Showing the Arrangement for Office Space Above the Warehouse

View of the Terminal Building from the Truck-Loading Site



Steel Roof Trusses Support Cement Tile Roofing Over the Warehouse Section of the Building. Canopies Extend Over the Team Drive and Also Over the Loading Dock

At Left—Interior of the Office on the Second Floor of the Terminal Building. At Right—This View of the Freight House Shows How Ample Provision Has Been Made to Facilitate Access for Cars and Vehicles

narrow house was adopted as most suitable to the conditions encountered. In an interurban terminal freight must be handled rapidly. Trains come into the station at frequent intervals in comparatively small units and they must be unloaded, reloaded and dispatched again on schedule within a few hours. In this respect the conditions differ materially from those obtaining on steam roads, where an excess of cars is available. Another essential characteristic of interurban freight movement which influenced the design of the terminal buildings is that a considerable proportion of the tonnage handled is moved in motor cars that must be unloaded promptly in order to avoid tying up expensive equipment.

In general, the speed of operations at a freight terminal was held to depend on the number of doors available. For a given floor area, a long house with increased number of doors was considered to meet the requirements for rapid movement of shipments better than a wider house. The same conditions obtain on the vehicle side of the house as on the track side. A long narrow structure with maximum number of door openings has been found to expedite the handling of shipments and to reduce the congestion of trucks and drays. These conclusions were based on experience in the operation of the freight house, 30 ft. wide, which composes the original unit of the present terminal, and which was operated by the Terre Haute, Indianapolis & Eastern Traction Company from 1918 to 1923.

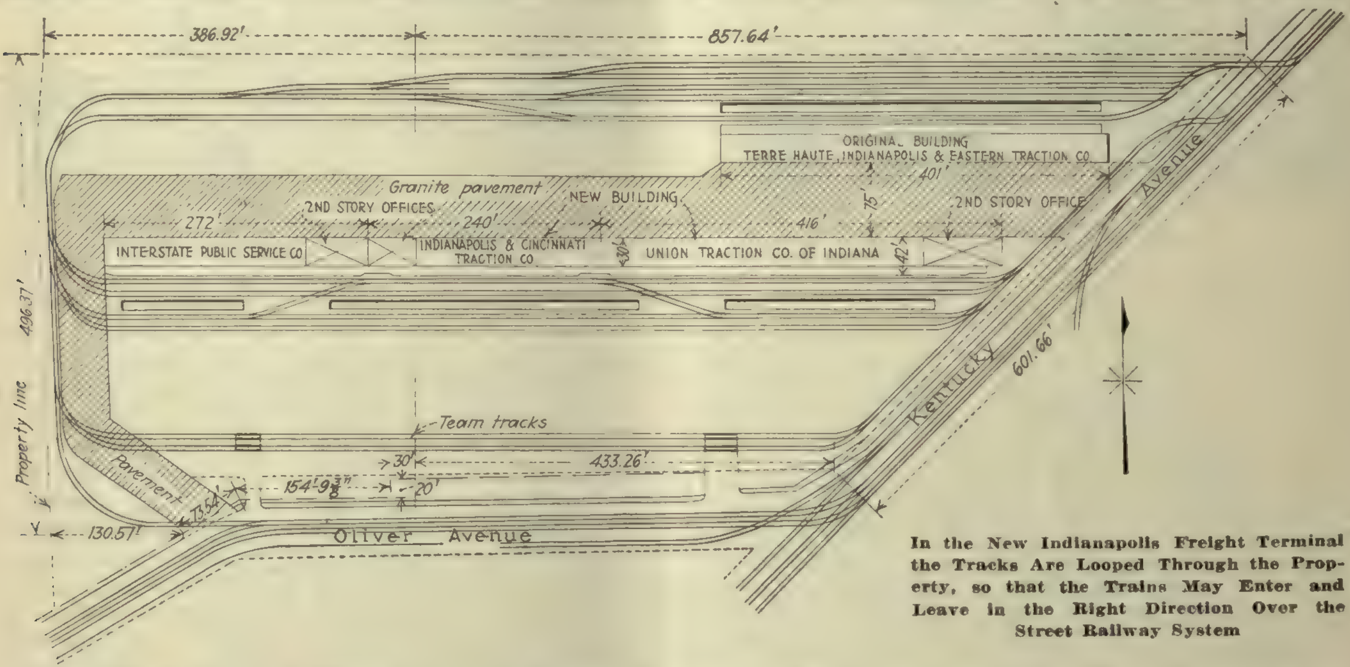
The floor of the freight house is carried at the same height as the floors of the cars. A 10-ft. loading dock extends along the track side of the building for its entire length and is carried at the same floor level. The head room between the floor and the lowest part of the roof trusses in the new house is 12 ft. Trusses for the roof are of steel, carrying a Federal cement tile roof. Canopies extend 10 ft. over the team driveway and similar canopies also cover the loading dock.

Seven Toledo "Seco" scales are placed in the building and are arranged so as to be convenient for weighing trucks. A small elevator is located in each of the two-story office sections and extends from the second story to the basement. These elevators are available for handling records and supplies to the storage space provided in the basement.

Under the two-story portions of the building the basement contains toilets, wash rooms, steam heating boilers, coal bins, lockers and storage space. An accompanying illustration shows a cross-section through one of the two-story sections, and also shows the arrangement for dumping coal directly into the storage bins from a car on one of the tracks. Ashes and trash can

The New Freight Terminal Is Shown at the Left and the Old One at the Right of This View Taken from the Kentucky Avenue End of the Buildings be removed and dumped directly into carts by means of large buckets and hoists provided for this purpose.

The occupancy of the new house is divided so that the Union Traction Company of Indiana has 416 ft. beginning nearest to the entrance of the station and including the two-story office section at this end. The Indianapolis & Cincinnati Traction Company occupies the middle 240 ft. and the Interstate Public Service Company has the west 272 ft. These latter two companies have office space in the middle two-story section.



In the New Indianapolis Freight Terminal the Tracks Are Looped Through the Property, so that the Trains May Enter and Leave in the Right Direction Over the Street Railway System

This arrangement is temporary, as it is planned to extend the present Terre Haute, Indianapolis & Eastern house approximately 600 ft. in the immediate future. When this is done, it is expected that the Interstate company and the T. H., I. & E. will jointly use one house and the Union Traction and the I. & C. will jointly use the other.

Even after the contemplated 600-ft. extension to the present north building is made there will still be room on the property for future expansion. Whether this future expansion will take the form of additional building space or whether additional team tracks will meet the requirements will depend largely on the results of further experience with the present arrangement.

This new terminal in Indianapolis represents the latest move in a long period of development of the interurban business in Indianapolis. With the formation of the Indianapolis Traction & Terminal Company in 1903, the first step in meeting the need for terminal facilities for the lines entering the city was taken. At that time nearly three-quarters of a city block was purchased close to the heart of the city, and on this space the present large passenger terminal was built. This consists of a nine-story office building, approximately 66 ft. x 185 ft., on one of the main business streets in the downtown section of the city. A 38-ft. x 185-ft. waiting room and a 245-ft. x 195-ft. train shed covering nine passenger tracks were included. This passenger station occupies slightly more than a quarter of a city block and was completed and put into service in the fall of 1904.

A freight terminal was subsequently added on part of the adjoining property. It originally consisted of three freight houses, 24 ft. wide by 195 ft. long, each house being served by two loading tracks. This freight station was put into service in 1905, and a fourth building was added in 1911. By this time, however, it was evident that the freight business was increasing at a rate which would soon make the existing facilities inadequate, and during the next few years various projects for increasing them were considered. The use of this old freight terminal rapidly became intolerable as the freight business continued to increase. The operation of city cars on the exterior tracks and the increasing vehicle traffic in this vicinity increased the congestion. The move to the Kentucky Avenue location was the ultimate result.

In its present location the new terminal is in the heart of the wholesale and shipping district, is within a radius which makes pick-ups by trucks serving various railroad freight houses convenient and is also within a very short distance of a new large terminal warehouse development in the city, which has included facilities for handling electric railway as well as steam road and truck shipments.

Railways Distribute 10,000 Folders per Week

A JOINT timetable, in which are featured many beauty spots and other points of interest along their lines, is published by the Columbus, Newark & Zanesville Electric Railway and the Indiana, Columbus & Eastern Traction Company. These companies, known locally as the "Red Egg" lines, have recently adopted orange and black as the standard colors for their equipment, and the present folder is made up with black printing on a single sheet of orange paper, 12¼ in. x 13½ in., folded to a size of 3 in. x 6 in. Attention is called to the summer resorts in this territory, to the fishing, boating and camping facilities, as well as the attractions of the various cities touched by these railways.

Included in the information given is a map showing all the lines of these companies, together with connecting electric railways in Ohio, Indiana and Michigan. The reverse side of the folder is taken up entirely with the timetables of the railway and bus lines, together with various connections to other interurban lines at Dayton, Springfield, Columbus, Lima and Zanesville.

The idea of the management was to make the folder as attractive as possible and, by avoiding the use of more than one color, to keep the expense at a minimum. It has been found that giving the folder a dressy appearance aids in the distribution. Approximately 10,000 folders a week are now being distributed through hotels, ticket offices and racks on the cars.

Training Carmen to Give Better Service

New Orleans Motormen Are Taught to Locate Minor Defects and to Handle Equipment Carefully—Instruction of Conductors Has Reduced to a Minimum Complaints of Discourtesy

BELIEVING that the employee's ability properly to perform his duties and his attitude toward the public are largely responsible for the good or bad feeling that prevails toward the railway, the New Orleans Public Service, Inc., New Orleans, La., has established a thorough course of training for all its platform men. Teaching motormen to locate minor defects and to make temporary repairs has made it unnecessary during the past year and a half to pull in any car during a trip and ask its passengers to change to another car. Training conductors has greatly reduced the number of complaints of discourtesy and impoliteness.

The training school was established in 1921 by A. B. Paterson, vice-president and general manager. It is under the supervision of D. C. O'Dowd, superintendent of transportation, with E. J. Murphy as superintendent of instruction. To aid in the work there are also three assistant instructors or follow-up men.

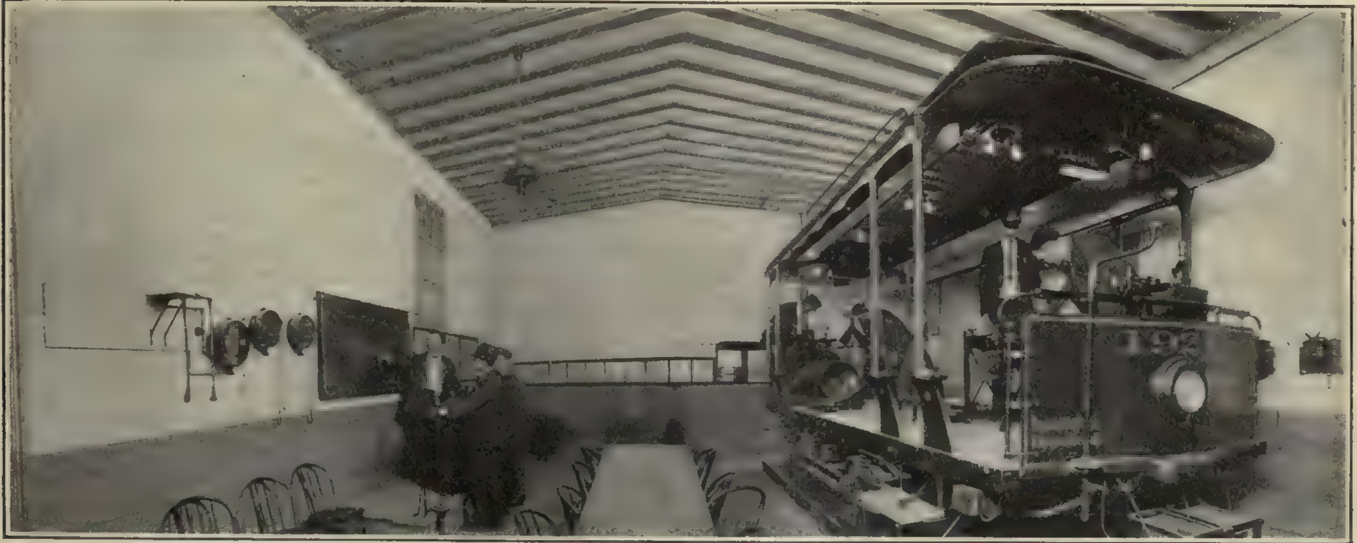
All applicants for work as trainmen are first carefully investigated to ascertain whether they possess the necessary qualifications. The disposition of the man is considered particularly important, and if investigation discloses that he is ungovernable, impulsive, or easily irritated, he receives no further consideration. After the applicant has been accepted for employment he is sent to the company's surgeon for a physical examination. If successful in passing this examination he reports the following morning at the training school for preliminary instructions. During his training period special emphasis is laid on courtesy and politeness, cleanliness, truthfulness, loyalty and honesty.

A student motorman is first placed on a stationary platform, equipped with three G.E.-K 11 controllers and three gooseneck hand brakes. These are set up in position similar to that which they would have on an ordinary single-truck car. One of the controllers is connected electrically to a cluster of four groups of five incandescent lamps, each group being arranged in the form of a square. This arrangement is used to impress upon the student the functioning of the resistance as the controller is advanced from point to point. Each square of lights represents a set of resistance grids and the lights are extinguished as the controller handle is advanced.

When the instructor thinks that the student has acquired sufficient knowledge of handling the controllers and brakes the instruction is continued on a blackboard located on the wall alongside the dummy controllers and brakes. The instructor illustrates the course of the current leaving the power house, through feeders and feeder taps, through the trolley wire, and trolley pole and the various parts of the equipment of the car, down to the wheels and rails and thence back to the power house. Ordinarily several applicants are under instruction simultaneously and the questions which they ask of the instructor and his answers serve to make clear any doubtful points.

Following this the class is assigned to a school car set up on a stationary platform above a short section of track. An old open car has been mounted on a framework of heavy timbers so arranged that the wheels have 3 in. clearance above the rails. Two 3-in. x 12-in. x 15-ft. sills are used as longitudinal supports with two 3-in. x 12-in. x 6½-ft. cross sills 2 ft. from the ends. The cross sills are reinforced by four round wrought-iron tie rods, bolted to the outside face of the longitudinal sills.

The car is completely equipped and ready for operation. At one end a G.E. type K-36-J controller has been installed and at the other end a Westinghouse type K-68-A. Overhead circuit breakers and an automatic line breaker are part of the equipment. The resistance is mounted on a stand on the floor in front of the dash, so that all the leads are in plain view of the



Teaching Student Motormen and Conductors in the Training School of the New Orleans Public Service, Inc.

student. The leads can be connected or disconnected at will.

Air brakes and hand brakes have been installed, together with an air compressor, tank, governor, gage, brake cylinder and general brake rigging. This equipment is placed on the floor in the car where its operation can be observed by the men under instruction. In addition to the ordinary electrical equipment of the car a voltmeter and an ammeter have been connected up to indicate the difference in the amount of current used when the car is properly handled and when it is improperly handled.

An arrangement of levers makes it possible to cause various defects in the equipment. These are: Open circuit in the controller, open circuit in the resistance, open circuit in No. 1 motor, open circuit in No. 2 motor, grounded resistance, grounded No. 1 top field, grounded No. 1 motor, and grounded No. 2 motor. Ordinarily these defects are created one at a time in the order stated, to teach the student to study his controller and ascertain what the matter is. After he has attained a satisfactory state of efficiency in this, the defects are introduced two at a time, or even three at a time. The prospective motorman is expected to be able to tell the instructor exactly what is wrong with the car, and how to repair it.

The car is equipped also with Hunter route signs, headlights and trolley catchers. A trolley base has been set up and attached to the floor of the room so that the student can observe how the apparatus works when the trolley pole is turned around. The student is taught the proper method of sanding track by operating a sand bin on the school car. On the wall of the school are three International cash registers used in the instruction of conductors.

PRACTICE AND THEORY COMBINED

After the preliminary instruction has been completed, the student is assigned to an experienced trainman for a period of fourteen to eighteen days instruction on the road. During this period the student is relieved for two trips a day and sent back to the school in order to prepare himself for a qualifying examination. These examinations are conducted by the superintendent of instruction and the student must at that time be able to locate and repair all the defects, explaining to the examiner the nature of the defect and how to remedy it. If he passes the examination successfully he is assigned to a carhouse and his name is placed on the extra list.

Thirty days later he is sent back again to the training school, to take another examination consisting of 81 questions pertaining to his work. The knowledge which he acquired during the training period is thoroughly tested, and he must be able to answer 75 per cent of the questions correctly. Thereafter the three follow-up men watch his performance on the road for sixty days and make reports concerning his progress.

An applicant for the position of conductor undergoes the same preliminary investigation as does an applicant for the position of motorman. Instruction begins with the proper way to make out a trip sheet, punch transfers, make change, and ring up fares on the register. Other men in the class under instruction simulate passengers and the student is required to go through the regular process for them. After doing that he makes out his trip sheet. He is then instructed as to his duties in case of accident, the necessity of making out accident reports and the proper way to do it. After the student has completed this preliminary instruction he is assigned to a competent conductor for the same period of experience on the road as it required of the motorman. He too must come back later for a final written examination. Emphasis is laid throughout this instruction on the necessity of courteous behavior toward the public.

Since the establishment of the school three years ago, all of the old trainmen of the railway, both motormen and conductors, have been called back to the training school and instructed in the same way as the new men.

Street Car Courtesy in Washington

BY C. MELVIN SHARPE
Executive Assistant Washington Railway & Electric Company

THE city of Washington, D. C., with its population gathered from the forty-eight states and from many foreign countries, being the seat of Congress, the home of the executive and administrative agencies of the government, presents a complex problem of street railway transportation. There are probably more tourists who do their sightseeing by trolley in Washington than there are in any other city of the United States. The railway platform men must therefore be specially trained to answer politely questions from the great number of strangers constantly visiting the city, and must be particularly well informed concerning the location of the various points of interest about the town.

In the training of its men the Washington Railway & Electric Company proceeds upon the assumption that the average man wants a superior over him who believes in, and practices, fair dealings in all matters. The company does not believe in paternalism nor in the hothouse method of coddling men with sweet phrases and frequent pats on the back for doing their duty to the public. It has been found that a course in ballroom ethics and the training in voice culture sometimes thought necessary to complete the effectiveness of a conductor's "Please Move Forward," as well as the idea of hollow over-thankfulness to the public, is a mockery and a delusion.

The company demands that civility shall be extended to every man, woman or child who shall pay fare and become a passenger on the cars, regardless of color, manner or general state of mind and position in life. The slogan is "Give every passenger more than a ride—make it a pleasant trip." When trainmen are imbued with that thought, it follows logically that they are carefully and attentive to the welfare, comfort and general interest of the passengers. In brief, the railway instructs its men to waste a minute of the schedule if a motorman or conductor can render an accommodation to a passenger that will bring to that passenger a sense of the unusual in service. It has been proved that the pleasant things in life are remembered and cherished. To see a conductor of the Washington Railway & Electric Company get off his car to conduct safely an aged or infirm person or child to the sidewalk out of danger is no uncommon sight, or to see a motorman lift a heavy suitcase from the car and carry it to the curb for a woman. In this way it is felt that the smartly attired trainmen of this company are rendering the entire industry a real service by the pleasant impression they give to the many thousand annual visitors to the capital.

Making and Erecting Concrete Poles

Casting Is Done in Horizontal Steel Forms with Reinforcing Rods Wired to Cast-Iron Rings and Suspended in Place—Portable Derrick Is Used for Erection

By Leon R. Brown
Office and Field Engineer New York State Railways

THE New York State Railways has been manufacturing and using concrete poles since 1910. This company operates in Rochester, Syracuse and Utica approximately 600 miles of track, of which 100 miles is third rail construction and the remainder overhead trolley. Tubular steel, concrete and wood poles are used, but recently nearly all new installations and replacements have been of concrete. The railway has two concrete pole manufacturing plants, one at its Eastwood yards, near Syracuse, and another just outside of Rochester. Poles for use on the Utica lines are made at Eastwood and shipped to Utica on flat cars.

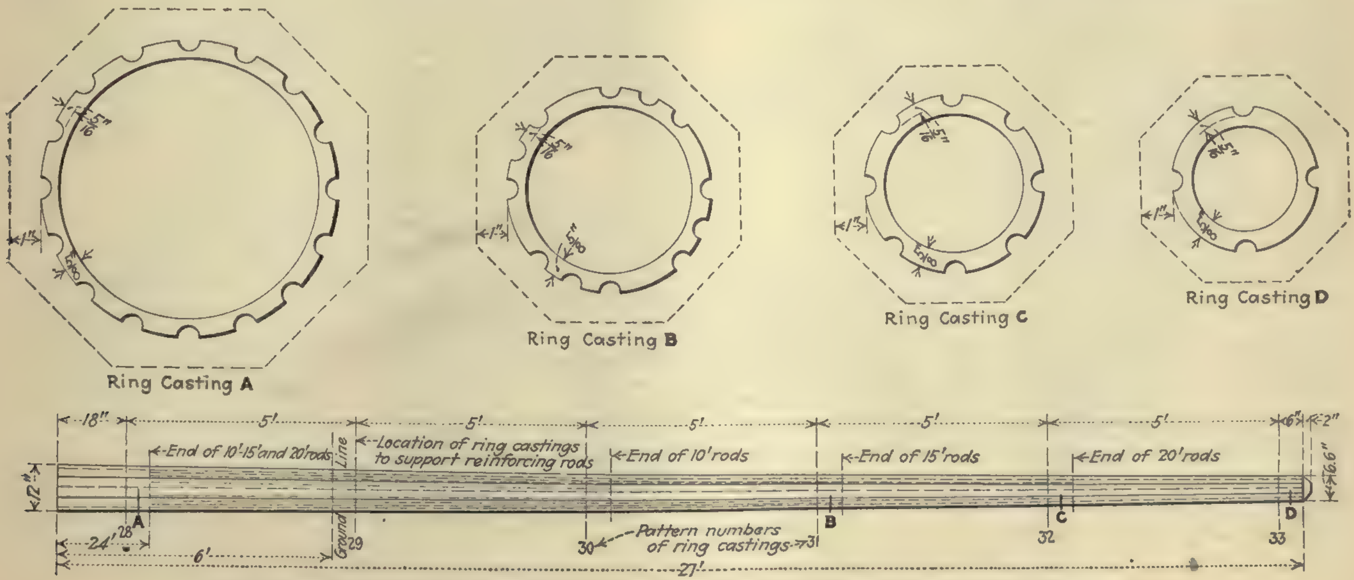
In Rochester the concrete poles are octagonal in shape and are cast in steel forms. The bottom of the form is anchored to a concrete base as shown in an accompanying drawing. Reinforcing rods are securely wired to cast-iron rings and supported in the center of the form from clevises spaced about 2½ ft. center to center. Pieces of round iron are placed wherever holes will be needed for crossarm bolts or other purposes. Dates, numbers and other distinguishing marks are cast on the poles by raised numbers and letters secured to the forms.

Concrete consisting of one part of cement, two parts of sand and two parts of gravel is mixed by hand in a mixing basin. A coating of light oil is applied to the inside of the forms before the concrete is poured. After 12 hours the auxiliary rods used to provide bolt holes are taken out. The sides of the form are removed at the end of 24 hours and after three days the pole is rolled aside to make room for another pole. After seven days it is placed on the pile of finished poles.

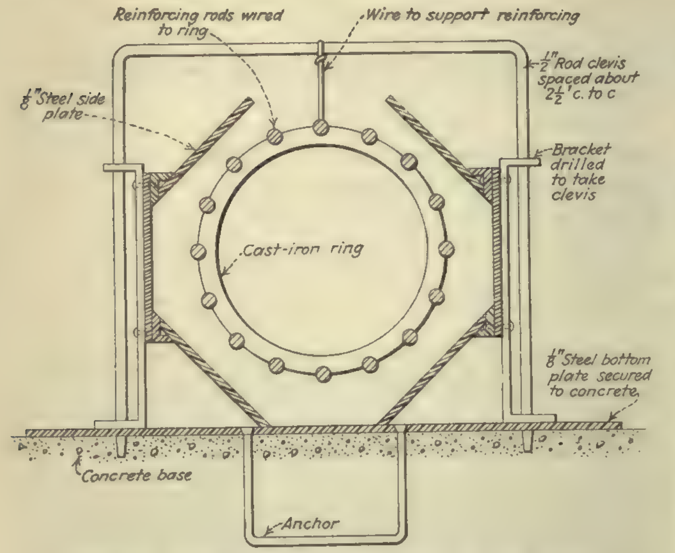
A Gantry Crane Spans the Pole Yard and Includes a Service Track and the Storage Pile

A gantry crane serves the entire pole yard at Rochester, including the storage pile and a service track. By this means poles are easily moved from the casting platform to the pile and from there to a flat car to be transported wherever needed. However, in the city when only a single pole is to be replaced it is sometimes hauled by motor truck. The output of the pole yard is six poles a day, and with six men employed the rate of production is a pole per man per day.

Poles manufactured for use on the Syracuse and Utica lines are of square cross-section with corners chamfered above the ground line. Four standard sizes of these poles are made. The standard trolley pole for



Ring Castings Support the Reinforcing Rods in the Type of Concrete Pole Used in Rochester


Reinforcing rods wired to ring
Wire to support reinforcing
⅛" Steel side plate
½" Rod clevis spaced about 2½' c. to c
Bracket drilled to take clevis
Cast-iron ring
⅛" Steel bottom plate secured to concrete
Concrete base
Anchor

Method of Supporting Reinforcement in Steel Forms

city construction, either bracket or span, is 30 ft. long with a 7-in. top. Interurban poles are 35 ft. long with a 7-in. top. For heavy city construction a pole 30 ft. long with an 8-in. top is used and for feeder lines the company uses the same size pole 45 ft. in length.

Wooden forms made of three 2-in. Georgia pine planks clamped in position by means of 2-in. x 4-in. notched sticks are used in Syracuse. Strips of triangular cross-section nailed inside the planks provide the chamfer of the corners. The gains are made by blocks nailed to the forms.

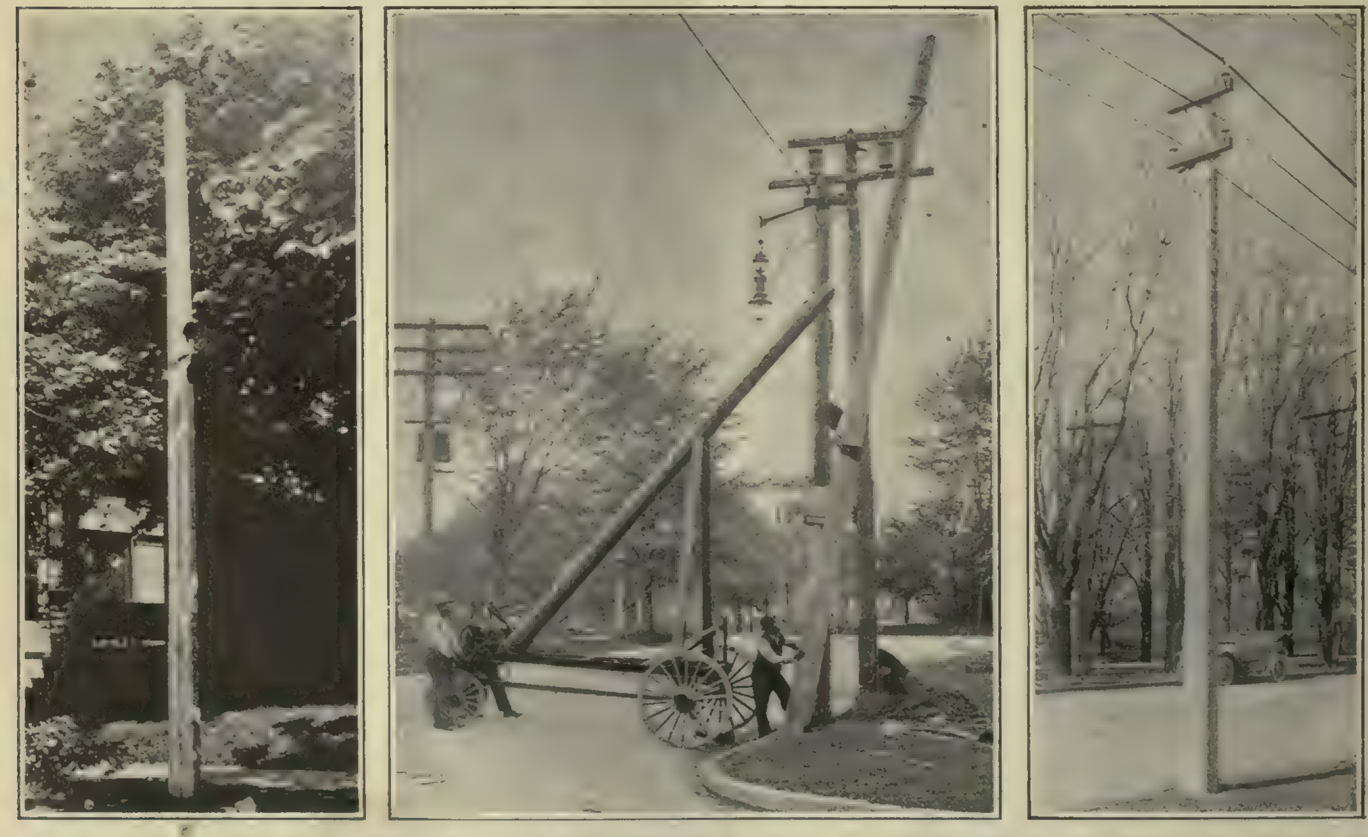
Concrete is mixed by machine and transported in a 1-ton hopper handled by a gantry crane. The forms are assembled on several blocks of sills to give a level bearing. After the form has been given a coat of old transformer oil a layer of concrete 1 in. thick is laid on the bottom throughout its length. Then four reinforcing rods properly spaced are laid and more concrete filled in until the form is one-third full. Two more rods are then placed about 1 in. from the side and an additional 2 in. of concrete is poured. Next two more bars are placed and the concrete filled to within 1 in. of the top of the form. Lastly four more bars are placed and the remaining space filled with concrete, the top being given a float finish.

While the form is being filled the concrete is carefully troweled and spaded, but no other ramming is done and no surface finish is used. The round irons which are run through the form to provide holes for the crossarm and other bolts are taken out eight hours after casting. The pole itself is taken out of the form three or four days after casting and is allowed to cure for two weeks before being used. After being removed from the forms the poles are sprinkled by an automatic sprinkler for several days.

The materials used in the construction of one pole consist of 4½ bags of cement, ⅓ cu.yd. of sand, ⅓ cu.yd. of ⅜-in. to ¾-in. broken stone, 118 ft. of ⅝-in. steel rods weighing 156.7 lb., and 190 ft. of ½-in. rods weighing 161.5 lb. The weight of a completed 30-ft. pole is 2,550 lb. It is estimated that a load of 985 lb. can be carried safely by such a pole. Labor costs are about 45 per cent of the total, materials 45 per cent and overhead 10 per cent.

The poles are erected with the assistance of a derrick wagon of unusual design. This was constructed by the railway using the frame of an old road scraper and a boom made from a wooden trolley pole. An accompanying illustration shows the derrick in operation.

In 1921 the New York State Railways placed 475



At Left—Octagonal Concrete Pole Used by New York State Railways in Rochester. In Center—This Derrick Used for the Erection of Poles Was Built on the Frame of a Road Scraper. At Right—In Syracuse Square Poles with Chamfered Corners Are Used

concrete poles, in 1922 the number was 359 and in 1923 it was 407. The decrease in the number of concrete poles set in the last two years has been due primarily to the fact that replacements are fewer as the percentage of concrete poles increases. On the Syracuse lines only about 100 wood poles now remain, and they are gradually disappearing on the other lines also. The difficulty of securing suitable wood poles because of the scarcity of timber has been the chief reason for using concrete poles. The first cost is about the same for the two types. While it is somewhat more expensive to install a concrete pole, fewer renewals are necessary. More than 6,000 concrete poles are in use on the property.

Public Reacts Favorably to Advertising Campaign

Memphis Street Railway Reaping the Reward of Consistent Program Involving Use of Paid Newspaper Space, Company Paper and Movie Films

REGULAR newspaper advertisements appearing in each of the daily papers of the city are being used each week by the Memphis Street Railway, Memphis, Tenn., an interesting little folder entitled "Trolley Items" is being distributed through the cars, and recently a news reel film, about 600 ft. in length, has been shown in some of the larger motion picture houses in the downtown section. The use of these media to reach the public are all developments of the last four months.

The picture film has been the cause of considerable attention on the part of individual citizens, among whom it has been a source of conversation on cars and the streets. The title of the picture, as flashed on the screen, is:

"The Public's Partner—the Street Car."

Introducing the scenes that are shown, appear these thoughts:

"The street car is a constant, faithful, necessary public servant. The public can aid in better street railway operation and service by co-operation with the company's efforts."

Some of the sub-titles, suggestive of the scenes that are shown, include the following:

"Boarding car promptly with exact fare helps to speed up the service.

"Blocking aisles or exit causes inconvenience to other passengers.

"Facing forward, and holding with the left hand, is the safe way to alight.

"The motorman has his trials to prevent accidents; especially do children playing near tracks cause him anxiety.

"Congested traffic is a factor in delaying schedules.

"Autoists who pick up passengers effect a reduction in the number of street cars and tend to reduce service.

"Street cars cause outlying fields to be converted into residence sections.

"Street cars help to keep factory wheels turning, as these employees show 'when the evening whistle blows.'

"Street cars are a dependence of the shopper in getting to town and back home."

The end of the picture shows a large group of employees, some at work laying tracks, others repairing overhead work and some in the shops, and after these separate scenes, a general one, that closes out with these words:

"We are partners with you. Co-operate with us."

Being run as a news reel, and distinct from any direct advertising, the picture was first shown in a house where no advertising of a direct nature is ever allowed on the screen, and afterward other houses used it readily.

WORKING TO PROMOTE SAFETY

The newspaper advertising of the company has featured in many ways its constant efforts to reduce accidents and solicited the co-operation of the people in this consistent campaign.

A novel part of the company's efforts is its plan to divide with the men the amount of the savings that can be effected through a reduction in the cost of accident claims and damage suits.

Under the caption "Street Car Men Get Neat Safety Bonus" the morning paper of the city recently carried a story telling of the fact that the platform men, on that day, were to have $4,381 distributed among them. The paper explained the plan for the benefit of the public in these words:

"The company instituted the plan, effective six months ago, of dividing on a 50 per cent basis the entire amount that could be saved through increased carefulness on the part of the men in reducing costs of accidents. During the first three months the men earned for themselves in this way the sum of $6,122. This added to the sum being distributed today makes a total of $10,503 by which they have increased their regular incomes within six months. The money is divided among the men on the basis of the hours which each has worked within the period, and for the past three months represents an increase of 1.27 cents an hour for each. During the first three-month period they earned 1.76 cents an hour additional pay through the operation of the plan.

"This bonus to the men, it is pointed out by officials, in no way adds to the cost of service, but, on the other hand, effects savings for the company, as one-half of the savings are applied to operating costs, the remaining 50 per cent going to employees.

"The money, as one of the officials expressed it, is just so much 'salvage,' as it would otherwise have been spent in satisfying damages and claims which were prevented by the carefulness of the men. 'We know this,' he added, 'because over a long period of years our damage claims have "averaged" a certain portion of the gross revenues, which we still set aside before calculating what we are saving by the present plan.'"

The leading afternoon paper, in commenting editorially upon this plan of the company, commended it cordially and pointed out that the people, through co-operation with the company, can work effectively in the interest of the men and assist them, while benefiting themselves at the same time in better and perhaps cheaper cost of service.

COMPANY ACKNOWLEDGES BENEFITS

The company realizes the beneficial effects from its consistent advertising campaign. It has acknowledged this by some of its own publicity. Several weeks ago there appeared in all the papers for a period of one week a word of thanks to the public, expressing cordial appreciation of the kindly co-operation manifested by the public toward the company.

The advertising appearing in the newspapers is printed under the caption "The Truth." Each installment deals with some particular phase of a subject. Recently a series of nine advertisements appeared on different phases of the subject "Picking up street car passengers." Some people were inclined to object to the company's suggesting that autoists refrain from this practice, but others wrote the company stating that they had been guilty in the past, but were through, and would allow the company to get its rightful revenue—a point to which they had not previously given much thought.

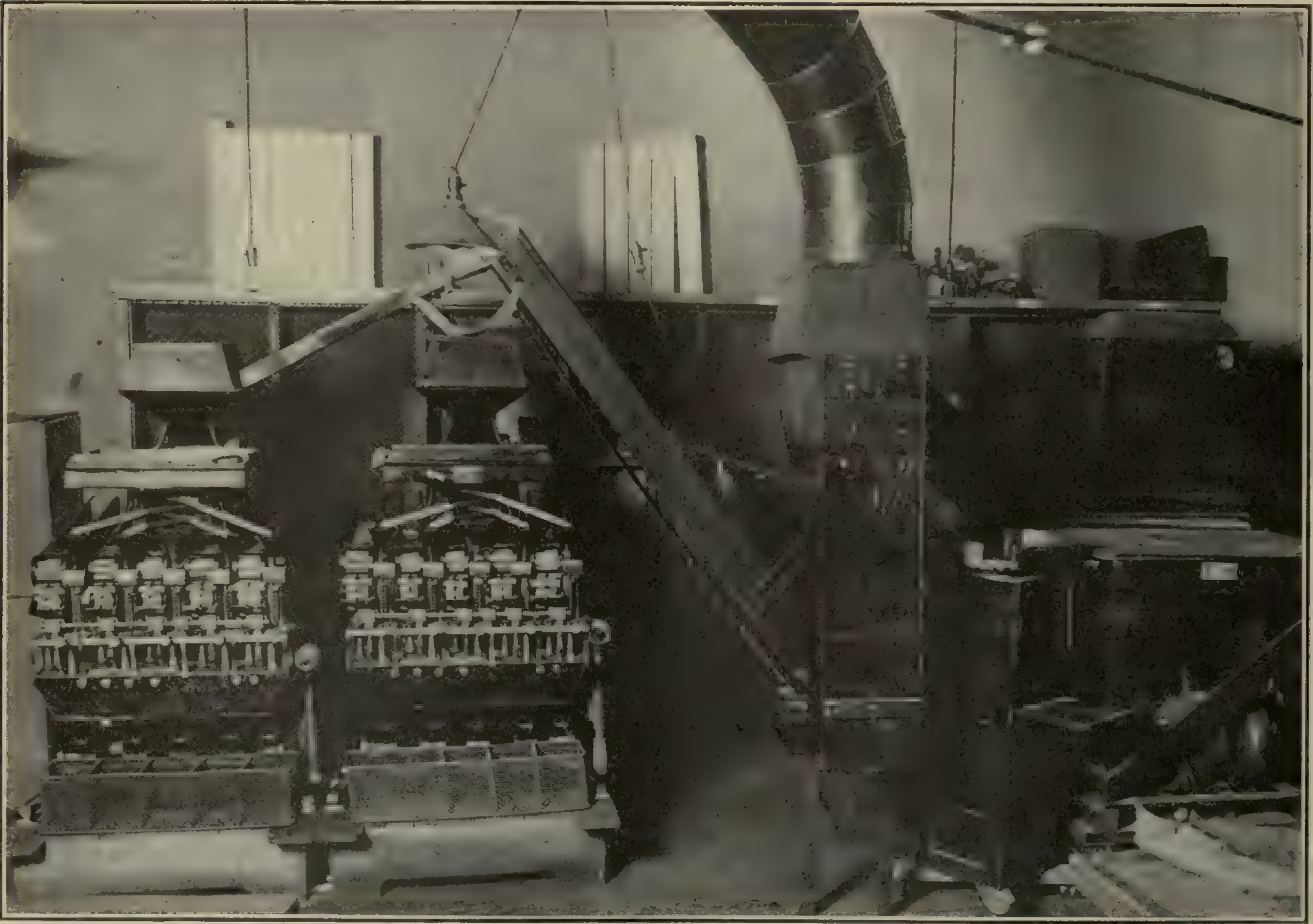
Fares Handled by Machine in East St. Louis

IN CONNECTION with the use of locked type fare boxes on the East St. Louis & Suburban Railway, East St. Louis, Ill., a system of turning in receipts has been adopted which insures minimum handling of money by employees. It also increases the speed and accuracy of sorting coins and separating the large variety of zone fare paper tickets in use on some of the lines.

To accomplish the result desired, a special receiving machine was designed and built in the company's shop. This machine is operated in conjunction with two Sattley motor-driven coin counters and is so arranged that the contents of the fare box vaults are automatically dumped when they are unlocked. The housing shown at the extreme right in the accompanying illustration receives the vaults. They must be put into position in this housing and inverted by means of an outside crank before they can be unlocked, as the vault key is padlocked to the metal housing in such a position that it will not reach the lock on the vaults until the latter have been inverted. The key is padlocked in position by the assistant cashier at the beginning of the day's work and is replaced in the safe by him as soon as the last vault has been emptied. The appearance and general arrangement of the machine are shown in the accompanying illustration.

Money and tickets drop directly into the receiving machine when the vault is unlocked. A blower fan is mounted so that the paper tickets are immediately separated from the coins and are blown into a sack mounted at the bottom of the rectangular chute shown in the illustration. The coins drop on a heavy screen shaker, which separates the large from the small coins before they drop on an endless belt conveyor which elevates them to their proper counting machine.

The money is then sorted, counted and wrapped by machine. From the time the receipts drop out of the fare box vault until the coins are wrapped they travel entirely under glass and are not touched by the employees. The wrapped packages of coins are sacked, weighed and checked against the meter readings of the machine before being forwarded to be deposited in the bank.

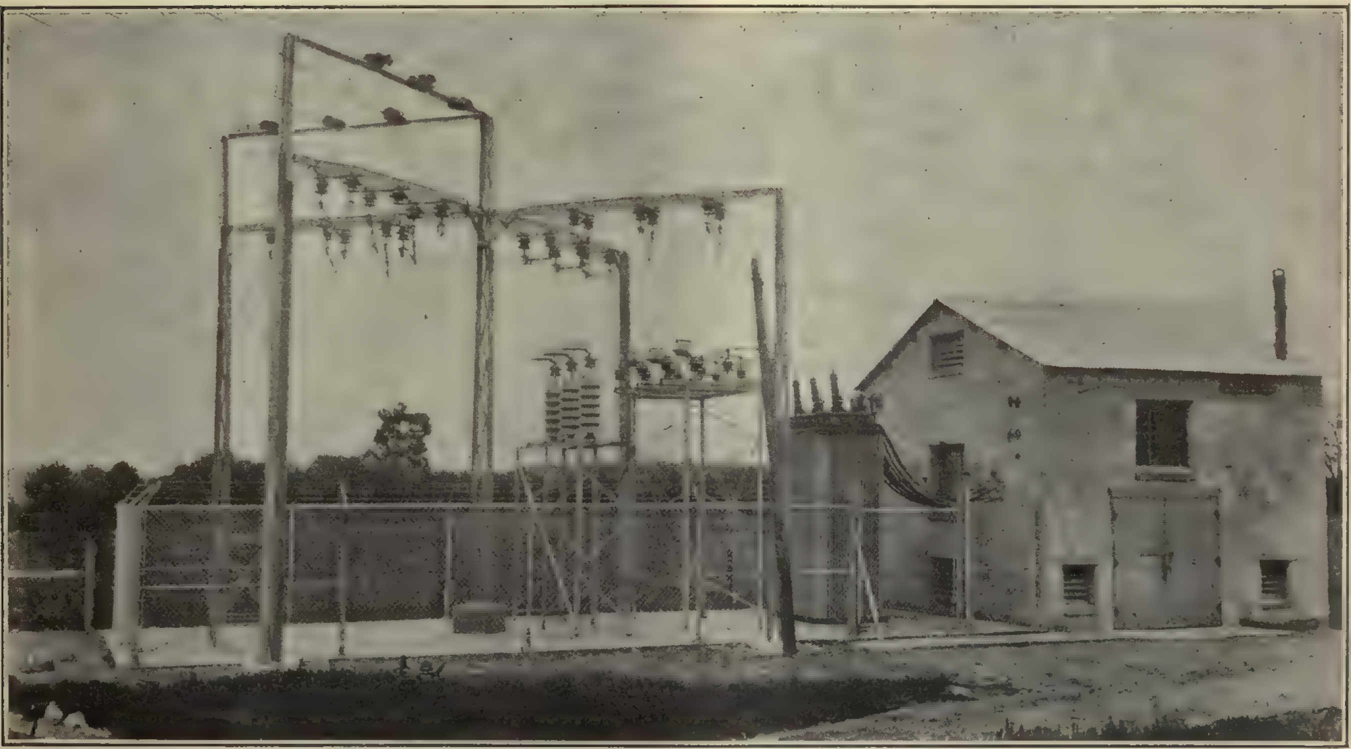


Receiving Machine Designed by East St. Louis & Suburban Railway for Sorting and Recording Cash and Paper Tickets Eliminates Handling of Receipts by Employees

How the Indianapolis & Cincinnati Line Was Rehabilitated

Second Article

Nine Full Automatic Substations, One of Which Is a Portable, and One Semi-Automatic Substation Supply 100 Miles of Single-Track Line on This Recently Rehabilitated System—The D.C. Feeders Are Sectionalized to Insure Continuity of Service



The Automatic Substations Have Been Built a Short Distance Off the Railway Right-of-Way on Land Owned by the Equipment Trust. The Outdoor Sectionalizing Installation at Hoffman Substation Is Typical

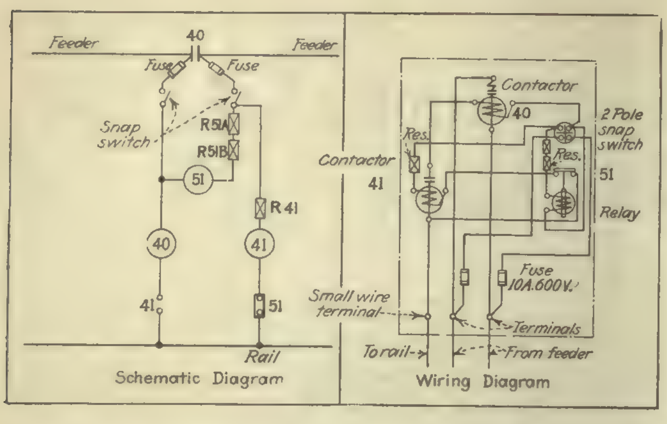
IN THE first article of this series, published in ELECTRIC RAILWAY JOURNAL for July 26, page 113, was given the general features of the changeover of the Indianapolis & Cincinnati Traction Company's system from 3,300 volts a.c. to 600 volts d.c. Following the present article, which deals with the substations and feeder system, will be a third article treating of the new cars with which the system has been equipped.

All of the substations and the new feeder system have been put in with these various conditions and future requirements in mind. Automatic substations were dictated by the saving shown in comparison with manual stations of the same capacity.

Manufacturers' estimates showed that a 500-kw. station with full automatic equipment would cost approximately $5,400 more than a station of the same capacity with manual switching. In making the comparison between manual and automatic stations, therefore, an allowance of $810 per year per station was made for interest, depreciation and taxes on the additional investment required for automatic switching equipment. An additional allowance of $500 per station per year was made to provide for the cost of high-grade inspectors to look after the automatic station apparatus. This gave an annual cost of $1,310 per year which was chargeable to the automatic installation, which would not obtain with manual operation.

In manual stations, however, the cost of operators was estimated at $100 per month for a 12-hour shift, making an annual cost per station of $2,400 for attendant's wages. An obvious saving of $1,090 per year per station was thus shown in favor of the automatic installation. This is exclusive of any saving to be expected as the result of eliminating the no-load losses which occur with manual stations in this class of service, due to the stations being allowed to operate continuously during periods when the power demand is only intermittent. Reduction of the problems connected with substation labor was held to be an additional advantage in favor of the automatic switching apparatus.

Automatic switching equipment for a 300-kw. station



Direct-Current Sectionalizing Contactor Equipment Is Mounted on Poles Along the Line. A Grounded Feeder Is Automatically Cut Out and Is Restored When the Ground Is Cleared

40, 41 main contactors
51 automatic reset relay
R41 resistance, 5,000 ohms
R51A, R51B resistance, 600 ohms

was found to cost approximately $4,600 more than hand switching. The hand-switching equipment cost for a 300-kw. station was almost as much as for a 500-kw. station. The automatic equipment, on the other hand, was less for a 300-kw. station than for one of 500-kw. capacity, primarily because smaller contactors are used in the smaller station. Since the saving in labor is the same on the 300-kw. station as on the 500, the saving for 300-kw. automatic equipment was found to pay an even higher percentage of return.

STATIONS LARGER ON RUSHVILLE DIVISION

The distance between substations on the Rushville division is 10.8 miles average, with a maximum of 11.88 miles. With a No. 0000 trolley and a 500,000-circ.mil copper feeder the maximum drop between substations is estimated at approximately 170 volts with two cars passing midway between stations. Assuming alternate stations out of service on this division, the maximum drop which would result with two cars passing midway between operating substations was estimated to be approximately 305 volts.

One 500-kw. synchronous converter is installed in each of the substations on the Rushville division, except Martin, where a 300-kw. converter was considered sufficient. Although 300-kw. converters might have been used in the other substations on this division to handle the existing traffic, they were not considered adequate for the service contemplated after making the extension to Cincinnati. There was also reason to expect development of freight traffic with heavier and more frequent trains. Since the 500-kw. substation cost was only 25 per cent more than that of a 300-kw. station, the use of 300-kw. converters was considered questionable, even if the extension to Cincinnati were not contemplated.

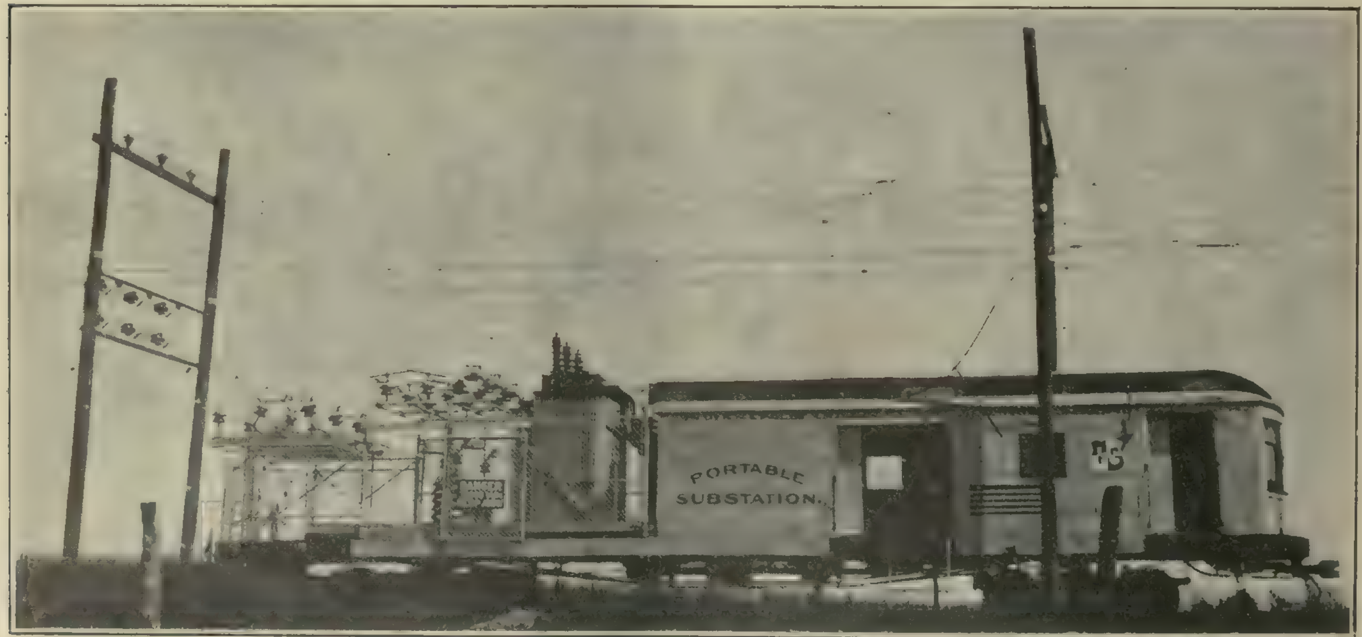
With single-unit substations such as were installed, it was considered desirable to make the conversion and distribution layout such that operation at a reduced schedule could be carried out with any substation out of service. The new system was designed to provide for such operation.

On the Shelbyville division, the average distance between the four substations is 11.8 miles average and 11.96 miles maximum. It was considered that 300-kw. capacity would be sufficient for the load that would be thrown on these stations.

BUILDINGS SMALL AND SIMPLE

All the substation buildings are practically identical in construction. They are made as small as possible, consistent with good ventilation and ample clearance for the apparatus. Hollow tile is used for the walls, and is covered both outside and inside with rough cement stucco. The roof is of corrugated transite, supported on 4-in. channel roof rafters. A concrete platform outside of the building supports all of the outdoor apparatus, which is protected by Cyclone steel fencing.

Each building is equipped with a telephone communicating to the central dispatcher located at the junction. It is the practice to clear all substation trouble reports through the transportation dispatcher, so that inspectors and trainmen's reports will all be



The 500-Kw. Portable Substation, Which Was Built on the Underframe of an Old Passenger Car, Has Full Automatic Apparatus. The Inclosed Portion Contains a Cabin with Sleeping Accommodations centralized at one point in order to facilitate the work of clearing up power trouble.

A small stove has also been installed in each station. This was put in for use by inspectors or repair men, who may be required to spend a considerable time in a station during severe weather, when making repairs.

FULL PROTECTION IN AUTOMATIC STATIONS

The full automatic stations start up on reduced voltage and shut down on reduced load, in accordance with general practice. The under-voltage d.c. relays in the trolley circuit are set to cut in at a voltage reduction of 20 per cent. The time-delay motor-operated relay then makes the first of the sequence of starting contacts, provided the voltage reduction continues. This time adjustment may be varied from about 2 seconds to approximately 5 minutes and is normally adjusted for 30 seconds. A magnetic clutch in the time relay acts to reset it after voltage reductions of short duration, so that they do not have a cumulative effect in starting the station.

This and most of the other apparatus in the stations is standard Westinghouse automatic substation equipment. Series grid resistances are used to prevent prolonged d.c. overload on the station.

For protection, the stations are locked out in starting if the machine fails to fall into step before the converter starting time-limit contacts are closed in the triple function motor-operated time-delay relay. This relay, in addition to fixing the time for starting under voltage reduction and the time allowance for the converter to fall into step, also controls the time for shutting down the station after the load falls off. As installed, these relays are set to shut down a station after 5 minutes if the load remains below 20 per cent of full load.

Phase unbalanced current will lock out a station during the starting period, or will shut it down during the running period. Hot bearings, a.c. overload or flash-over of the converter will also lock out a station. A station will be temporarily shut down, or prevented from starting, by overheating of the grid resistors. This will also occur by reversal of the direct current.

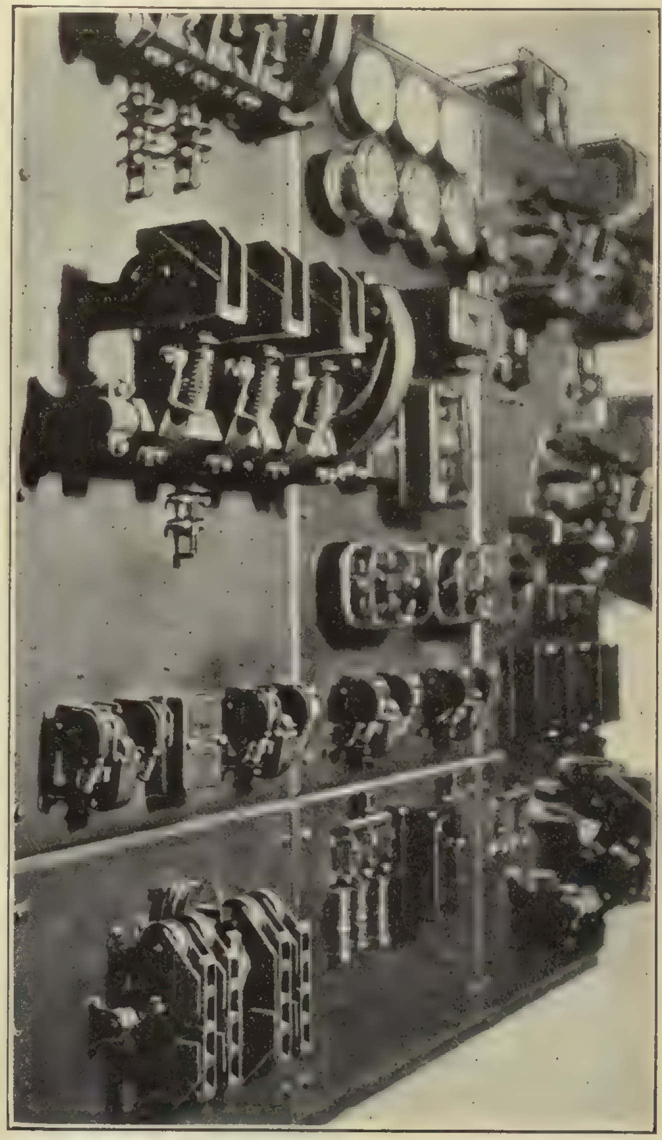
If a reverse phase exists a station cannot start up. In the case of loss of field the machine is disconnected from the d.c. end. After a station has been shut down temporarily for any cause, it cannot start up again until the field current has died down. An overspeed device shuts down a station when the machine speed becomes excessive. Low a.c. voltage also prevents starting.

The combination of a short-circuit detector with the d.c. feeder contactor is another feature of interest in connection with this installation. This is accomplished by a relay arranged so that rapid rises in the direct current causes it to function, whereas a steady increase in load, even considerably above full load, only causes the series resistance of the station to be cut in. This relay is also combined with a reset relay, so that after the main feeder contactor has been tripped out on account of a short circuit, it is reclosed when the feeder resistance becomes such as to give half load on the machine.

SEMI-AUTOMATIC STATION STARTED BY HAND

The semi-automatic station must be started up by hand in a manner similar to that used in starting a wholly manual substation. The operator starts the converter by throwing a three-pole double-throw hand-operated breaker to the starting position, waits until the converter has come up to speed, reverses the polarity if necessary by means of a hand-operated field switch, and then throws the breaker to the running position. From then on, the automatic equipment assumes control and the operation is almost identical with that of the full automatic station.

To shut down the semi-automatic station by hand, the operator opens a single-pole knife switch in the circuit of the d.c. machine contactor relay coil. He then trips the three-pole double-throw oil circuit breaker. In the event of an automatic shut-down, the sequence of these operations is taken care of automatically.



Typical Automatic Substation Control Panel. All the Substations Except Rushville Have This Type of Control Equipment

This station is provided with protective features very similar to those in the full automatic stations. Phase unbalanced current during the running period will lock the station out. Hot machine bearings, reverse direct current and flashing over of the converter will lock out the station. Overload on the a.c. side will trip the oil circuit breaker. Overheating of the grid resistors in the d.c. circuit, or overheating of the machine windings, will temporarily disconnect the station from the d.c. feeders, or will prevent it from being connected to the d.c. bus when starting up. Loss of field disconnects the machine from the d.c. end. Overspeed results in disconnecting the machine from both the d.c. and the a.c. ends. The short-circuit feeder detector on the semi-automatic station operates similarly to that on the full automatic stations, except that the d.c. feeder contactor opens in the event of a feeder short circuit on the semi-automatic station, whereas the d.c. bus contactor opens under like conditions on the full automatic stations.

THE PORTABLE STATION IS FULL AUTOMATIC

In addition to the permanent stations, a portable full automatic station has been provided. This unit has a capacity of 500 kw. and may be moved to any point on the system where sidings are available to help out in the event of trouble with any of the permanent stations, or unusual loads at any given location. It was constructed from an old passenger car which was heavily reinforced by means of steel plates across the car under the original framing, and a duplicate set of truss rods installed full length in order to reinforce the longitudinal sills.

Power wiring under the body is carried in conduits of sufficient size to take the necessary cables. A number of large special junction boxes were required and these were made from sheet steel by welding them together in the company's shop.

As shown in the accompanying illustrations, the car was long enough to permit all the outdoor high-tension apparatus to be installed with sufficient clearance, without increasing the height much above that of the inclosed body. As a precaution against fire, the interior of the inclosed portion forming the converter room is lined with sheet metal, including the roof. On the floor, large rubber mats protect employees who may have occasion to work on the interior while the station is in operation. There is a cabin at the front end of the car, equipped with a small stove and bunks for employees who may be required to remain with the station during emergencies.

SECTIONALIZING FEEDER CONTACTORS MOUNTED ON POLES

An interesting feature of the d.c. feeder system is the installation of feeder sectionalizing contactors at eight important points. This equipment functions to disconnect a short-circuited section of feeder from the rest of the system, and to restore the connection automatically as soon as the trouble has been removed. Each unit consists of a combination of relays with a contactor mounted in boxes on poles at certain points along the right-of-way.

Referring to the schematic diagram on page 164, the operation of this equipment may be readily analyzed. Assuming that the contacts of the main contactor 40 are open, and that the feeder is energized on both sides of the contacts, with relay 51 de-energized, relay 41 will pick up and close the circuit to contactor 40 coil. This contactor picks up and closes its contacts, thus joining the two sections of the feeder. This is the normal condition existing when the feeders are in regular service.

If a short circuit occurs between the trolley or feeder and ground, on the side to which 40 is connected, the small size of the feeder cable will cause a very large drop in voltage so that both contactors 40 and 41 will drop out. As soon as contactor 40 has opened normal voltage is restored to relay 41, which starts to pick up. If the contacts of 41 close, 40 will not close, since the coil is on the short circuited side of its own contacts. Meanwhile, as soon as the 40 contacts open, relay 51 is subjected to the difference in voltage between the two sides of the feeder. A difference of about 300 volts will cause this relay to pick up, thereby de-energizing relay 41, which in turn closes the circuit to the coil of 40. This closes the contacts of 40.

On the other hand, if the short circuit occurs on the side of the feeder to which relay 41 is connected, the contactors will drop out because of under-voltage as before, but with the opening of 40 contacts the voltage situation is reversed from the previous case. Normal voltage is available for the coil of 40, but this contactor cannot close because 41 remains open due to the low voltage imposed by the short circuit continuing. Relay 51 functions as before, and when the voltage difference drops sufficiently this relay drops out and thereby energizes relay 41, which in turn energizes the coil of 40 and allows the contactor to close.

The operation of this sectionalizing equipment depends on the high resistance of the feeder circuit so that a short circuit will cause sufficient voltage drop to make the contactors drop out. The voltage at which this occurs is approximately 30 per cent of normal. This reduction is made quite large to prevent the sectionalizing equipment from functioning under ordinary overloads.

SERVICE MAINTAINED DURING CHANGE

Service was maintained on both divisions of the property throughout the period of changing over to 600-volt operation. The work was carried out so that the d.c. zone was gradually extended from station to station, as the new automatic substations were set up and made ready for service.

In carrying out this program it was also necessary to carry out the change in the transmission system to correspond with the extension of the d.c. zone, as the high-tension lines were changed from 25-cycle, single-phase power to 60-cycle, three-phase.

On each division, the work of changing over was started at the junction and progressed from station to station until the end of the division was reached. During the process of changing, the d.c. area was fed from the junction switching station while the a.c. area was fed from Rushville power house.

The old cars, equipped with single-phase motors, were operated over both a.c. and d.c. sections until an entire division had been completed. New cars with d.c. equipment were then put in service. As each new substation was connected to the distribution system, the trolley in that section was changed from a.c. to d.c. Consequently it was necessary to make all taps from feeders to trolley in that section during the night before commencing d.c. operation.

Paper Matches Promote Traffic

THE Union Street Railway, New Bedford, Mass., recently purchased 10,000 paper match folders advertising the attractions of Lincoln Park, owned by the railway, half way between New Bedford and Fall River.

These folders were placed in cigar stores, drug stores, summer hotels, etc., within a radius of 50 miles, to promote traffic to the park.

Oil-Electric Locomotive for Freight Service on Tenth Avenue, New York

Oil-Electric Engine in New York

THE New York Central Railroad has put in operation on its Tenth Avenue freight extension, New York, a 60-ton oil-electric locomotive for hauling freight cars through the streets of New York City. The locomotive was built jointly by the General Electric Company and the Ingersoll-Rand Company, and carries a 300-hp. oil engine with six cylinders, operating at 600 r.p.m. and driving a 600-volt, 200-kw. generator, with separately excited shunt fields and differential compound series winding to give a voltage variation of from 200 to 750 volts. There are four HM-840 General Electric motors, one geared to each of the four axles. The control is automatic, to the extent that the power is controlled by a throttle lever similar to that on a steam locomotive. Opening the lever increases the engine speed from idling to full speed within the limits set by the overspeed governor, and the current passing through the differential series field gives an output of the generator equivalent to the input of the engine. The locomotive then automatically accelerates without any loss of power in the rheostat.

The oil engine is of the Price-Rathbun type using solid fuel injection. The consumption of fuel is about 0.45 lb. per horsepower-hour. Owing to the absence of smoke or visible exhaust, this locomotive is particularly adapted for street service in New York City.

Demand for De Luxe Service Increases in Michigan

OWING to the increasing demand for high-speed de luxe interurban service out of Detroit, the Detroit United Railway has added chair cars to several of its interurban lines.

One of these lines is that between Detroit and Flint, on which two new chair cars have been running since the end of last May. These cars are fitted with multiple-unit control and M.C.B. couplers and operate sometimes singly and sometimes in a train with another type of car, but the chair car is always used as a lead car. Three runs are made each day from Detroit and from Flint, and the charge for a chair is 50 cents. Each car carries thirty chairs, ten in the smoking compartment and twenty in the main compartment. These seats are not stationary but can be moved about to suit the convenience of the passengers.

The bodies for these cars were built in the shops of the Detroit United Railway. They have an over-all length of 58 ft. 3½ in. and an over-all width of 8 ft. 7¼ in. The interior trim is mahogany. They are mounted on C-80-P-Standard trucks with 36-in. wheels and are equipped with Westinghouse 303 motors. Each car weighs complete 85,700 lb. The car carries a roller destination sign covered with glass. Two views of this car are given below. Further particulars of the equipment will be found on page 188.

A somewhat similar car but of a lighter type, also built in the shops of the company, has been put in service on the Pontiac division. Two of these cars are required to give the service. The interior finish is somewhat different, the side posts and headlining being of ivory enamel and the wainscot paneling of dark green burlap. The chairs are of wicker, upholstered.

For additional coach service, the company has recently purchased from the St. Louis Car Company ten attractive cross-seat cars, seating 16 passengers in the smoking compartment and 38 in the body of the car. This car is 26 ft. 1¼ in. over all and weighs 63,000 lb. It is mounted on Brill No. 27 M.C.B.-2 trucks, each truck carrying two G.E.-275-A motors.

Front End and Interior of Smoking Compartment of New Chair Cars Operating Between Detroit and Flint

Association News & Discussions

Paris Congress Largely Attended

The Topics Discussed at the Meeting on June 16-20 Included City Planning, Car Design, Engagement of Transportation Employees, Track Construction and Bus Operation—About 400 Delegates and Guests Were Present

THE sessions in Paris on June 16-20 of the International Tramway, Light Railway & Bus Association (Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles), were preceded by an event of great personal interest to the members of the association. This was the presentation of a testimonial to Mr. de Burlet, who retired as president last year after an administration of more than ten years. The presentation took place at a reception to the members on the evening of June 16, at which about 400 delegates and guests were present. The president of the association, Mr. de Lancker, expressed the regret of the members that Mr. de Burlet, after so many years devoted to the interests of the association, had felt obliged, owing to his advancing years, to retire from the office of president. He then referred to the distinguished career of his predecessor, pointing out that it was largely owing to Mr. de Burlet's ability and devotion that the association had won such prestige, not only in Europe but elsewhere throughout the world. Mr. de Lancker also referred to the action of Mr. de Burlet during the war in succoring French refugees hunted into Belgium from the north of France and in protecting the women and children against the enemy's soldiery, for which action he had had to spend a number of months in a German prison. Mr. de Lancker then presented to Mr. de Burlet, in behalf of the association, a bronze figure representing "Protecting the Hearthstone."

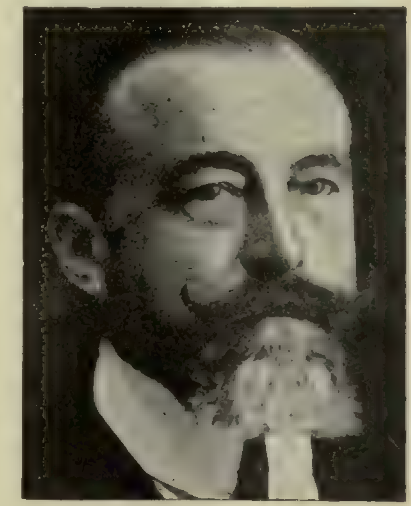
Mr. de Burlet replied gratefully, attributing, in his modesty, the success of the association to the assistance of his associates on the executive committee and said that while he could no longer serve as president, it was his greatest pleasure to see the association prosperous and marching on toward a brilliant destiny.

TRANSPORTATION AND CITY PLANNING

The first technical session of the association was held on Tuesday, June 17, and was devoted to a consideration of the relation of transportation to city planning. The paper on this subject, prepared by G. Delavenne of the Paris Municipal Council, was read by Mr. Labussière of the Paris Tramway. This paper appears in abstract in this issue. By a series of charts, the author showed the development of transportation lines in the city of Paris and its environs from 1861 to 1924, also the total rides and rides per inhabitant by years for Paris since 1889, for Düsseldorf and Berlin since 1904 and for Chicago since 1885. There was no discussion.

CAR CONSTRUCTION

The afternoon session was devoted to the subject of car construction and equipment, discussed in three reports, the reports being presented respectively by Messrs. Dubath of the Swiss Industrial Company at Neuhausen, Harmel of the Liége Tramways and Ricaud of the Marseilles Tramways. Abstracts of these reports will appear in an early issue of this paper.



F. de Lancker
President Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles

In the discussion which followed, several delegates testified to the satisfactory results secured with roller or ball bearings. A greater difference of opinion developed over the advisability of the use of radial trucks. Mr. de Croes of the Belgian National Light Railway system said that eighteen cars on that property had been equipped with the radial truck, but had not been in operation long enough to give definite results. The truck had been installed on this line because of satisfactory results reported to have been obtained in Ostend.

The discussion then developed along the lines of the proper wheelbase to use with curves of different radii, with both rigid and radial trucks. Mr. Bacqueyrisse, superintendent of rolling stock of the Paris Tramways, declared that he had lost interest in the radial truck. He said that it had been on the market for twenty-five years and had been used by a number of French companies, but had in practically all cases been abandoned in favor of a rigid truck with the long wheelbase, even as long as 3.6 m. (11 ft. 10 in.) for a single truck car. The Paris tramway system has 700 cars of this type and wheelbase and has had no difficulty in operating them around curves with 18-m. (59-ft.) radius. In his opinion it was as easy to get cars with a 3.6 m. wheelbase around such a curve as if radial trucks were used. The fact must not be forgotten that both radial trucks and short wheelbase trucks have a nosing movement which is injurious to straight track. Personally he would prefer to wear out a few feet of curve with long wheelbase trucks than to wear out an equal number of miles of straight track through the nosing effect of radial trucks or short wheelbase trucks. He was equally skeptical about the benefits to be derived from ball bearings, at least so long as it costs as much as it does at present to install them.

Mr. Castaing, chief engineer of rolling stock, Paris Tramways, said that the motor cars with the long wheelbase and parallel axles in Paris made about 35,000 km. (22,000 miles) before the wheels had to be re-turned. On T-rail construction the mileage of the tires before re-turning was 40,000 km. (25,000 miles). The cost of maintenance for double trucks per car was from 15 to 20 per cent more than for the long wheelbase single-truck cars and radial truck maintenance cost was at least 10 per cent higher than for trucks with rigid axles.

After a brief discussion on electric brakes, Mr. Gasquet called attention to the subject of storage battery cars, which, he said, although completely abandoned in France, had come into a certain use in Germany. He pointed out that several German companies had recently ordered thirty-nine new storage battery cars. Other delegates expressed themselves as not seeing much future for the storage battery system.

There were no technical sessions on Wednesday. Instead the delegates made a trip by motor cars to Versailles to visit the Château and the Trianon. They lunched at Versailles and in the afternoon visited the park of St. Cloud. In the evening they held their annual banquet. Mr. Peytral, Minister of Public Works, presided and Mr. Mariage, general manager Paris Tramways, welcomed the delegates to Paris in behalf of the transportation interests.

ENGAGEMENT AND DISCIPLINE OF TRANSPORTATION EMPLOYEES

The first topic at the meeting on Thursday was the engagement of transportation employees, as presented in reports by Mr. Bacqueyrisse of Paris and Mr. Prins of Brussels. An abstract of the report by Mr. Bacquerisse will appear in an early issue of the ELECTRIC RAILWAY JOURNAL. An abstract of the report by Mr. Prins was printed in the issue of this paper for June 21, 1924.

In his oral introduction to his report, Mr. Bacqueyrisse pointed out that motormen who have been with the company a short time are much more liable to accidents than those with a long period of service. He also said that railways give a great deal of scientific attention to the selection of their equipment and they should do likewise with their personnel. He believes, in choosing men, that the object sought should be normalcy. A motorman who is overcautious is about as bad as one who is careless.

TRACK CONSTRUCTION

The next subject discussed was that of track, on which four reports were presented. Abstracts of three of these papers have already been published in this paper. (See ELECTRIC RAILWAY JOURNAL for July 5, page 20; July 12, page 58; July 19, page 97. The fourth, by Mr. Bouton, appears in abstract in the following pages of this issue. In presenting his report, Mr. d'Hoop took occasion to explain a confusion which had crept into it, owing to his reference to the three standard grooved rail sections proposed by the Swiss Commission on Standardization (and reproduced on page 97 of the issue of this paper for July 19, 1924). Mr. d'Hoop said that he brought these sections to the attention of the association as a matter of general interest and not necessarily for action in the way of adoption at the present session.

Mr. Bouton, Paris, said that a study on rail standards was being conducted by the French Tramways Association and that it was hoped a recommendation would be made before long. Mr. Badesco, Bucharest, made certain suggestions in regard to dimensions which he thought were desirable in standard rails, notably a thicker base than that recommended. The subject of the desirability of the future adoption of rail standards was then referred to a committee.

In continuing the discussion on the reports presented, Mr. Gagne said that he was not in accord with the statement in one of the papers that only those parts of special work subject to great wear should be of manganese steel. Parts subject to slight wear should also be of wear-resisting material. Otherwise, inequality in wear of such installations would result and be bad for the rolling stock. After outlining the soil and traffic conditions with which solid and flexible track construction were respectively more desirable, Mr. Gagne explained a statement made in the report in the July 5 issue, page 20, saying that rails 24 m. (78.7 ft.) had been used by the Paris Tramways. Mr. Gagne said that a few 24 m. rails had been laid in Paris, but no new rails of this length were being laid. The longest now being used were 18 m.

In the discussion on inspectors, as considered in the paper by Mr. Prins (ELECTRIC RAILWAY JOURNAL, June 21, page 990), Mr. Barthelemey said that while the number of inspectors on the Paris system was high as compared with other systems, a reason can be found in the variety of fares charged, and he considered the expense justified.

INDEPENDENT UNITS FOR BRANCH STEAM LINES

The session on Thursday afternoon was given up to a consideration of the use of independent motor cars on trunk line branches and light railways. The report on this subject related largely to various possible economies in steam locomotives, such as feed-water heaters, superheaters and oil burning. There was no discussion.

BUS OPERATION

Mr. Bonhomme, manager of the Société des Transports Automobiles Industriels et Commerciaux of Paris, presented a report on bus operation in Paris. An abstract of this report will appear in an early issue of *Bus Transportation*. Considerable space in this report was taken by a discussion of various substitute fuels which are being tested in Paris for gasoline. One of the speakers pointed out that it was very desirable to develop a motor for commercial vehicles capable of using a second-grade fuel which owners of private cars decline to purchase. Of these substitutes, alcohol in various combinations seems most promising. In the discussion on storage battery buses, the Paris delegates gave rather a doleful account of their experience and said storage battery buses had practically disappeared from that city.

Mr. Bacqueyrisse gave some comparative operating expense figures applying to buses and trolley cars. Those for the buses were for all the buses operating out of a certain depot in Paris with a capacity of from 80 to 100 buses and consequently corresponding to the equipment of an average line. Those for the trolley cars are the averages for the entire system and consequently include a considerable lot of old equipment. With the latest type of cars the figure given below for trolley cars, he said, will drop to fr. 2.50 per car-kilometer (20 cents per car-mile). The figures are for February last and (with the franc at 5 cents) are as follows:

OPERATING EXPENSES ONLY—AVERAGE FOR FEBRUARY, 1924, PARIS

	Francs per Car-Kilometer	Cents per Car-Mile
Motor cars	2.86	22.88
Trail cars	1.44	11.52
Buses	2.43	19.44

In the evening the delegates in a party attended the opera.

BUSINESS SESSION

The session on June 20 was devoted to the business of the association. The report of the treasurer was read and approved. Members of the executive committee elected were: Messrs. Vanden Broek, Thonet, Salvadori, Barth and Rochat (re-elected) and Noirfalize and Tomicki (new members).

It was decided to hold the 1926 meeting in Barcelona, Spain.

Track Switches for Electric Railways in Paved Streets*

The Tendency Is Toward Manganese Steel with a Switch in Each Line of Rail Instead of a Switch in One and a Mate in the Other—Other Phases of European Practice Described

BY G. BOUTON

Vice-President East Paris Tramway Company

TWENTY-NINE electric railway properties replied to the data sheet on track switches, sent out by the author. A number of these systems, including those in Bordeaux, Havre, Orleans, Glasgow, London, Naples, The Hague, Buenos Aires and Paris, have replaced all of their built-up switches with switches made of cast steel. Strasbourg, Rotterdam and Utrecht hold to built-up work, but the majority of the systems reporting have a great variety of types, including manganese steel. The use of cast steel, particularly of manganese steel, for this purpose, is spreading, because of its low maintenance cost, and in spite of its high first cost. In addition to manganese steel, tests have been made with high carbon steel for this purpose and (in America) with chrome nickel steel. A switch of manganese steel, with average traffic, should last about 12 years. Though manganese steel is satisfactory as regards wear some companies have found that cupping occurs at the points where the switch is joined to the rail, and these points have to be built up by welding.

In general, the practice is to use a tongue switch in each side of the track rather than one tongue switch and mate, in spite of the added complication of connections. The tongues of these two switches are connected by a rod under the pavement, so that they move in unison. Where a switch with a single tongue is used, the tongue is usually on the inside of the curve, but Glasgow has obtained better results by using it on the outside. Most companies have found, however, that with a single switch, with mate, the point of the latter becomes worn in the direction of the greater traffic, and cars going in the direction of less traffic may be derailed. The use of the single switch and mate should be confined to special cases, such as lines but little used, entrance tracks to depots, etc.

A few companies, among them the company in Paris, are using switches with immovable tongues for both rails on turnouts. This is accomplished by eliminating the curve at the entrance to the turnout, as shown in Fig. 1. Such switches can also be used in other places, as on the exit tracks at carhouses where all of the exit tracks lead in to one ladder track.

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*Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

Switch tongues should be fairly long, say from 2 m. (79 in.) to 2½ m. (98 in.). They may be straight or curved. When curved, the radius is generally 20 m., 30 m. or 50 m. The use of a curve on the tongue reduces the blow from the wheel when it enters and leaves the switch. Formerly the outer end of the tongue was sharp. Now it is generally flat or rounded, say from 7 mm. to 8 mm. (about 5/16 in.) across, or preferably more. To prevent the tongue from rising, a horizontal bolt can pass through the tongue or preferably through a lug on its lower side, or the lower part of the point can be held down by an extension of the bed of the switch, as in Paris (see Fig. 2). In Buenos Aires the novel construction is used of having a groove in the tongue for the passage of the wheel flange (Fig. 3). This means that at its point or outer end the tongue has a width at the base of 65 mm. (2 9/16 in.) and nearly the same width on top.

In built-up switches the heel of the tongue is always carried on a pivot (Fig. 4) and this practice is followed in many of the cast-steel switches installed. In other cast steel switches, the heel is mounted on a stud (Fig. 5), or it may be held in place by a keeper or lug. In some types of cast-steel switches, there is provision for taking up the wear on the under part of the heel by wedges.

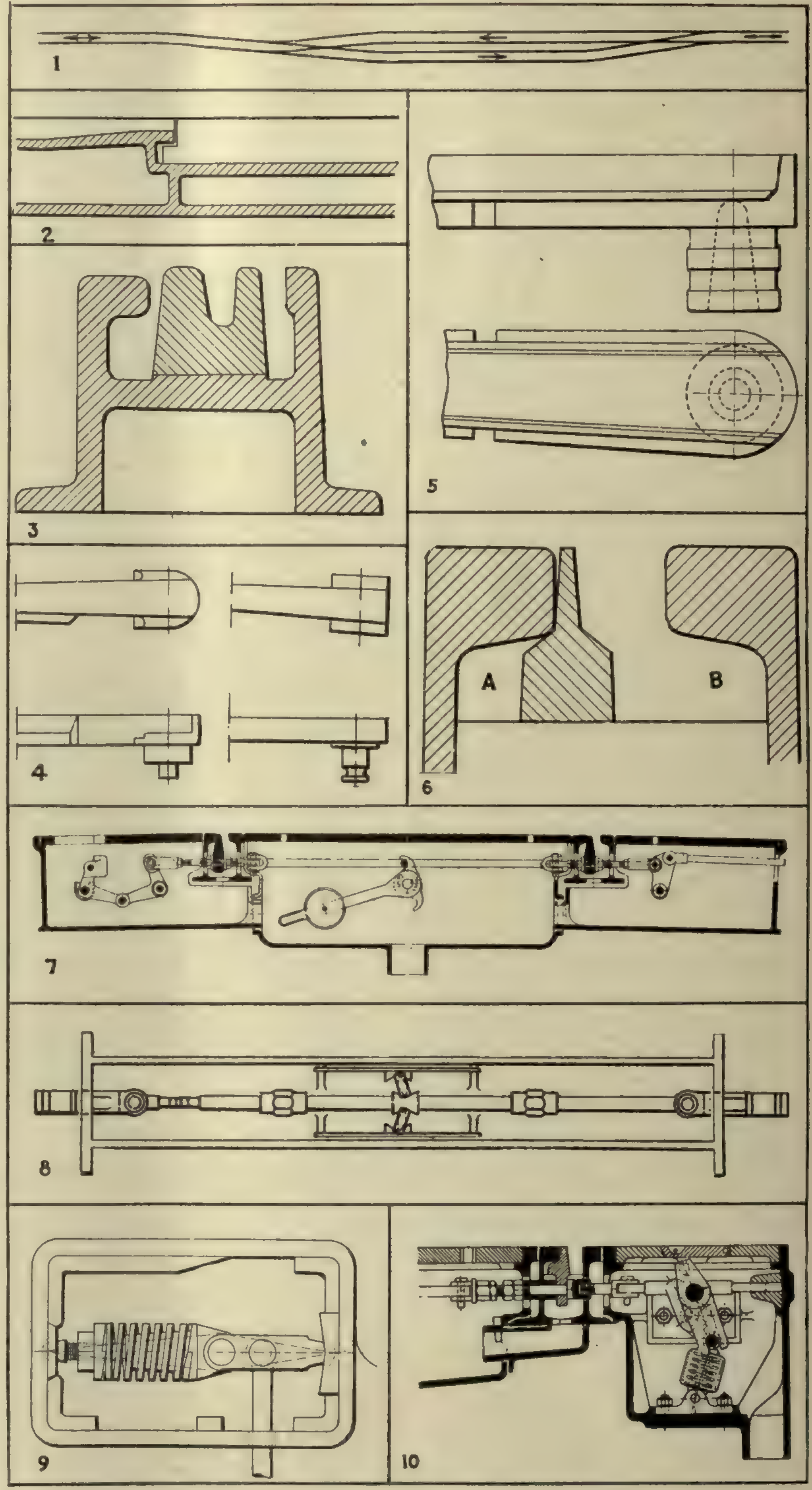
In general, the base of the tongue is broadened out to provide a greater wearing surface, but Geneva has found that with tongues having an enlarged base and recesses, as in Fig. 6, snow and ice are apt to become packed in the pockets marked A and B. In consequence, this company is abandoning this type of switch for one in which the tongue and tongue bed have straight sides. Most cities, however, declare that the switches can be kept clear of ice and snow by salt. The Lille Tramways reports that where a worn tongue is replaced by a new one, it is desirable to build up the switch bed, if worn, by welding, so that the new tongue will lie flat.

Switches are sometimes bolted and sometimes welded to the adjoining track, but the application of welding to join up manganese special work with running rail is still in the experimental stage. If bolted up, especially long angle plates should be used.

OPERATION OF SWITCHES

Switches can be operated mechanically or electrically. Mechanical methods of operation vary all the way from the movement of the tongue by a switch iron in the hands of the motorman or conductor to the operation of the switch by a switchman in the street or on the sidewalk. Hand operation by the motorman obviously is suitable only for lines of light traffic.

Positive action of the switch tongue, or of the switch tongues in double-pointed switches, is obtained in a



European Types of Track Switches for Use by Electric Railways in Paved Streets

Fig. 1—Through turnout not requiring tongue switches.

Fig. 2—Longitudinal section showing method of holding down point of switch tongue in Paris.

Fig. 3—Cross-section of switch bed and tongue, Buenos Aires.

Fig. 4—Two methods of mounting tongue heel on pivot, Geneva.

Fig. 5—Mounting of tongue heel on stud, Paris.

Fig. 6—Section of switch bed and tongue formerly used in Geneva but abandoned because snow became packed in the pockets A and B.

Fig. 7—Cross-section of track showing use of counterbalance in Marseilles for securing positive action for double-pointed switch.

Fig. 8—Method of securing positive action of switches, Paris.

Fig. 9—Method of securing positive action of switches, Buenos Aires.

Fig. 10—Method of securing positive action of switches, Geneva.

variety of ways, as by a counterbalance as in Marseilles (Fig. 7); with a spring lock, as in Paris (Fig. 8) and Buenos Aires (Fig. 9), and with a pivoted spring, as in Geneva (Fig. 10).

ELECTRIC SWITCHES

There is a great variety of electric switches. They may be operated by (1) an overhead contactor, (2) insulated section of the trolley wire, or (3) insulated section of the track, over which the motorman passes with current on or current off, according to the position in which he wants the switch. One system only, the Henrard-Levêque, requires no attention from the motorman. In this there are two or more contact studs fixed on the side of the trolley pole below the harp, and these complete one of several circuits as the trolley pole passes through a trough cut into the overhead structure. These studs can be set on the poles of one set of cars so as always to throw the switch in one way, and on another group of cars to throw the switch in another way. While this system has the advantage that it is entirely automatic, the studs on the trolley pole have to be adjusted with pretty close exactness. Complications are produced also when cars for emergency have to be changed from one route to another, and the automatic features of the system tend to make the motorman feel that he has no responsibility when the car is passing over a switch.

The other types of electric switches differ in the form of contactor or method of switch operation, but all are under the control of the motorman. These switches can be arranged for (1) "power-on" operation, or that in which the motorman takes current only when he wishes to change the position of the switch, or (2) for "power on and off" operation, in which the motorman takes current or does not do so depending upon whether he wishes to go to the right or to the left. Both systems are used quite extensively, but the one first mentioned seems safer because when a motorman approaches a switch he must look to see what its position is, so does not get careless.

Motive power for these electric switches may be supplied by a solenoid or a motor. The former is cheaper in first cost and takes less space and is generally to be preferred. The action of a motor, however, is less abrupt, so switch maintenance may be lower with a motor.

The Influence of Transportation on the Growth of Cities*

The Author Suggests that Harmonious Development of Transit and Housing Calls for Public Ownership and Private Management of the Transport Facilities as Well as Possible Public Ownership of Suburban Areas Suitable for Wholesale Housing Plans

BY G. DELAVENNE
President of Municipal Transport Commission and Reporter-General of the Budget, Department of the Seine

SOME eager spirits have raised the question whether population follows or precedes transportation. The answer cannot be given out of hand. History shows that so far as old cities are concerned, they evolved without any thought being given to public transportation. It is only in recent times that this matter has been considered.

In the period just before the French Revolution, Quesnay denounced the tendency of the peasants to desert their farms for the city to batten on the extravagance of the court and nobility at Paris. The attraction of the city was greatly increased in the nineteenth century through the advent of the machine age with its corresponding change from the independent worker to the factory. This brought an ominous change in the method of city growth. Theretofore, the development had been toward the creation of numerous communities, each of which specialized in some particular industry so that the worker could stay within walking distance of his job. Transport was almost entirely a question of the carriage of food and other supplies to and from the geographical center and between the different sections.

The second step came with the introduction of regular public service routes. By 1854, ten concerns in Paris consolidated and in 1855 received the thirty-year franchise which marked the origin of the Compagnie Genérále des Omnibus. While this development marked a partial change from vertical to horizontal growth, it was noteworthy that the population density of the newly served sections tended more and more to approach that of the ancient center.

By 1873, the population had spread beyond the city walls and tramways had been built to connect communes north and south of Paris. Up to this time, also, speculation in land had been limited, so that the population tended to follow the routes of new transit facilities closely. All this occurred under animal traction with an average speed of only 6 to 7 m. (3.7 to 4.3 miles) per hour. With the arrival of mechanical traction giant steps were taken in 1890-1910 in the growth of the suburbs as compared with the inner city. Paris' suburban population grew from 693,000 in 1891 to 955,692 in 1901, to 1,039,345 in 1906, to 1,266,000 in 1911 and to 1,505,219 in 1921. Since 1861 Paris city has grown only 50 per cent, while the remainder of the department (of the Seine) has grown 200 per cent.

London shows much the same story. In 1861 the strictly metropolitan area had 2,803,000 inhabitants and the outer ring only 418,000. In 1881 the ratios were 4,000,000 to 1,400,000, the city showing 50 per cent increase, but the suburbs 240 per cent. Within the last thirty years the suburban population of Berlin has increased tenfold.

It is this tendency toward diffusion of the inhabitants through improved transport that has led some anticipators of urban possibilities to echo Vandervelde's prediction that: "The cities of the future will not be centers of habitation so much as agglomerations of public buildings and monuments, places for meeting and for work and rendezvous for business, pleasure and study."

While we have not yet reached this stage, we may hazard the statement that public utility transport has at least partially changed the city from a gathering of immobile inhabitants threatened with dead rot to a mobile community capable of spreading horizontally instead of vertically.

TRANSPORT AS RELATED TO ACTUAL CITY LAYOUT

It is only in recent years that municipal authorities have sought to direct the hitherto spontaneous growth of cities. Just now, in particular, the scarcity of houses and the presence of slums make more difficult the problem of spreading the population without violence to the natural tendencies of the inhabitants.

Here enters the fact that with every new Paris line there comes the same erection of six and seven-story tenements as in the center. This is so marked because of the increase in land values produced by the extensions that while the increase of all the suburban population of Paris was 200 per cent in the period 1861-1921, that of the sections directly served by the new transport facilities was 484 per cent. So this uncontrolled relationship between transit facilities and housing has led to the same congestion and high rents in the outer districts as was formerly unique to the center.

At the 1912 convention Herr Kuhles uttered a profound truth when he said that a route established through an unbuilt district without a complete understanding with the land owners along the line as to the construction of homes is a hindrance rather than a help to satisfactory urban development. Means must be taken to assure that the good from such a line will go to the public which pays the cost rather than to the speculator. Haphazard, speculative development which simply creates new congestion centers belies the true purpose of transport, viz., the diffusion of the population.

One way to secure the harmonious co-operative development of transport and housing facilities is suggested by the land-purchase policy (*Bodenpolitik*) of German municipalities. In this case, the same authorities who have control of transit have purchased large tracts which have not been thrown open to the public until the necessary transport and other public facilities have been prepared. The Department of the Seine is now trying town planning of this order at Courneuve and Sceaux. This kind of development not only assures a well-planned housing development but it permits the institution of a tax on surplus land values which helps to defray the cost of the lines.

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*Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

That improvement in the speed of vehicles and, more lately, the greater leisure due to the eight-hour day increase the riding habit or mobility per inhabitant [aside from effect of increased area and population not mentioned by the author.—EDS.] is apparent from the following table:

INCREASE IN RIDES PER INHABITANT PER ANNUM, YEARS 1904 TO 1913

Department of the Seine (Greater Paris)	160 to 260
Düsseldorf	70 to 180
Berlin	230 to 325
Chicago	220 to 300
Average increase, approximately,	33 per cent

It has been noted that the larger industrial groups have shown a tendency to move away from city centers for such reasons as excessive cost of land, sanitary regulations, need for better waterway and railway conveniences, etc. On the other hand, the movement of the offices, shops and amusements is inward. The conversion of residence into business sections has been especially noticeable in recent years. Despite legal efforts, such as the declaration of restricted districts, this movement is inevitable. Here, again, it is the function of transport to assure the freest possible circulation between the center and the suburban homes of the office and store workers.

PUBLIC OWNERSHIP AND PRIVATE MANAGEMENT A LA PARIS RECOMMENDED

Three ways are open to the functioning of city transportation enterprises, namely, unrestricted competition; local or general monopoly; public ownership with either public or private management.

In discussing the matter in 1912, Herr Kuhles said that the fault of private ownership was that there was expansion only where a profit was probable and with no regard to civic welfare, while the fault of public ownership was uneconomic overexpansion. Both points are founded on reason, but as this is not a perfect world we must choose the lesser of two evils. As a matter of fact, the financial and urban problems made more acute by the war have caused the large-scale development of metropolitan transportation to slip from private hands into those of the State.

This is what has happened in Paris. Four years ago, the Council-General of the Seine took over the existing surface transport systems preliminary to carrying out elaborate plans for their expansion. Then came the agreement whereby public ownership and private management, under lease, collaborate in financing the property while the company remains subordinate to the state in matters of routing, service, fares, standards of equipment and the like.

The question of rates of fare merits attention without regard to political considerations. No fare scheme can be called normal if the income from the property fails to meet both the costs of operation and all overhead expenses, including amortization. Fares higher than this are likely to be beyond the means of the average rider and therefore would automatically cut down the public's freedom of circulation and growth of the community. On the other hand, fares below cost would result in unjustifiable deficits except where part of the cost would come from the taxation of surplus value created by extensions. Despite the illusions of the public on the subject, only a trifling reduction in fare is possible through further reductions in general costs. An appreciable reduction is possible only by lowering the standard of service, as by longer headways and fewer seats per passenger. This would naturally tend to reduce travel in spite of the lower fares which are intended to increase it.

The "no fare at all" theory of the socialists is no less dangerous. The increase in land and building taxes which free-ride operation would necessitate might lead to prohibitive rentals that would offset the saving in fare.

After all, it should not be forgotten that because of advances in the art and in general efficiency, electric railway fares of self-sustaining undertakings today show far less increase than both the wholesale and retail indices of the cost of living.

Midwest Claim Agents Meet

Hold Active Convention at Des Moines—Many Papers Presented on Topics of Interest to the Claims Department

THERE were about thirty-five claim agents in attendance at the convention of the Midwest Claim Agents Association, held at Des Moines, July 18-19. The program, as printed in the issue of this paper for July 12, was carried out, except that E. A. Funke, claim agent, Lincoln Traction Company, Lincoln, Neb., was not able to be present, but his paper was read by Mr. Bennett of the Des Moines City Railway.

The two-day convention was opened with an address of welcome by Mayor Carl M. Garver of Des Moines, after which Trevor C. Nielson, claim agent East St. Louis & Suburban Railway gave the annual address of the president. Mr. Nielson referred to several causes, among them the automobile, for increased accidents, said that the claims men were finding greater help through conferences than formerly and urged all to work continuously, not spasmodically, for greater safety and fewer claims.

The "Rule of the Res Gestae" was the title of the paper delivered Friday morning by Hon. Herman M. Geuch, Judge of the Municipal Court, Des Moines. The speaker pointed out that in almost all American courts, declarations uttered by parties to a transaction which are the natural outgrowth of the transaction, spontaneously expressed and so nearly coincident in point of time that they may be taken as part of the transaction and explain it, are admissible as evidence. This is one of the exceptions to the hearsay evidence rule. In street railway accidents, these declarations, in so far as the railway company is concerned, are generally made by the motorman or conductor in charge of the car. The rules governing the admission of such evidence have been stated many times by the court. Thus, in the case of the Fort Wayne & Wabash Valley line, a declaration said to have been made by the superintendent that he should have known better than to have put a certain motorman in charge of a car, was not admitted as evidence when made long after the occurrence at a point 12 miles away from the place of the accident.

As a rule, only declarations made by persons competent to be witnesses are admissible, though they may be made by a bystander. A bystander's declaration is not admitted in some states, as for instance, Arkansas, Kentucky and Louisiana. Formerly it was held that the declaration must be contemporaneous with the transaction, but the decisions of modern times indicate that perfect coincidence of time is not required. Thus, in the case of the Spokane Railway, a statement made by the conductor of a derailed train two hours after its occurrence was admitted, and in another Washington case in which a boy was knocked unconscious by an accident, statements made when he recovered consciousness eight days later were admitted under the doctrine of *res gestae*. On the other hand, a statement made by a motorman that he was responsible for an accident in a Detroit case, after he had been threatened by a mob, was not admitted. The tendency of recent decisions is to relax the rule of admissibility rather than to restrict it.

That the claim agent, in order to be successful in his work, need the co-operation not only of the general public, but also of the railway employees, was brought out by T. G. Kelly, superintendent railway and claims, Fort Smith Light & Traction Company, Fort Smith, Ark. The best way to enlist this co-operation, according to Mr. Kelly, is through personal contact with the employees and the public. It is worth while to make a point to get acquainted with nearly all the employees. The railway should pay nominal damages if it believes it is liable regardless of whether the injured party would be able to prove damages in court.

Results obtained from a co-operative plan for the reduction of accident costs were told by C. B. Proctor, claim agent, Memphis Street Railway Company. The individual bonus caused a material increase in the number of unreported accidents because it failed to encourage the reporting of all minor happenings. Safety campaigns, dinners, meetings, prizes, etc., were tried but were not entirely satisfactory because the tendency was to reduce the number of reported accidents without materially reducing the accident costs. A co-operative bonus plan was therefore finally adopted whereby the men participate in the saving in accident costs made by the railway. As a result of this, the cost has been reduced from 5.59 per cent of gross earnings to 4.03 per cent of earnings.

That the modern claim agent is in reality a purchasing agent specializing in only one commodity—releases—was asserted in a paper by E. G. Funke, claim agent, Lincoln Traction Company, Lincoln, Neb. Various types of releases were analyzed by Mr. Funke, who described the essential points that should be embodied in order to stand legal attack.

The paper by F. W. Stockmar on "Outside Factors Affect Damage Claims" was printed in abstract in the issue of this paper for July 19.

One of the most spirited discussions of the convention was that which followed the paper by Mr. Robinson of Cincinnati. His urging of the practice of the Golden Rule and his theory that many claim departments are stirring up contestants by "soup to nuts" investigations brought nearly every man in the meeting into the discussion.

Another paper which proved most interesting in that it dealt entirely with the human element was that by Mr. Mahan on "Men." Emphasis was laid by Mr. Mahan upon the necessity of the claim department having an intimate touch with trainmen, and an assistance in their education on safety measures.

A feature of the meetings not on the regular program was a short impromptu talk on "Safety" by Mrs. C. B. Hardin, wife of the claim agent of the United Railways, St. Louis. Mrs. Hardin is a full-fledged member of the association and had a lively discussion with D. M. Finch of the Des Moines City Railway on the work of the safety councils in cities.

Each paper brought out a spirited discussion. The attendance was not so large as to require formality in procedure, and almost every claim agent present took part in the discussions. Almost no reader of a paper got through without submitting to a fire of questions.

D. M. Finch, claim agent of Des Moines City Railway, was host to the convention, and on Friday evening the claim agents were taken for an automobile ride around Des Moines ending at the Wakonda club, for dinner.

In the annual election of officers held Saturday morning the following were chosen: President, T. C. Neilson, East St. Louis; vice-presidents, S. G. Shaw, Denver, and D. M. Finch, Des Moines; secretary-treasurer, W. C. Adams, East St. Louis; committeeman at large, C. B. Hardin, United Railways, St. Louis. All of these choices were re-elections with the exception of the secretary-treasurer.

New England Club Holds Annual Outing

A ROUSING good time was had on July 24 at Norumbega Park, Mass., by the New England Street Railway Club, when 400 members and guests assembled for the annual outing of the organization. Harry H. Hanson of the Middlesex & Boston Street Railway was general chairman of the outing committee, and with his associates lived up to the program's promise that there should be "something doing" from 10 a.m. to 10 p.m.

The program included a wide range of outdoor sports for both men and women, and there was also many attractions for children. Families of club members were generously represented in the attendance, and the annual "costume baseball farce" between the street railway men and the supply men aroused great enthusiasm. The forenoon program featured sports for women, and after a box luncheon sports for the men and the ball game filled the time until about 4.30, when a series of water sports for men and women was run off. Following dinner came the award of prizes and the evening performance at the park theater. Provision for golf was made at the near-by Woodland Golf Club.

Central Accountants' Association Program

THE program of the Central Electric Railway Accountants' Association summer meeting, which will be held at Hotel Cleveland, Cleveland, Ohio, Aug. 15 and 16, 1924, has been announced, with the exception of the address of welcome. All meetings will be held on Eastern standard time.

The program follows:

Friday, Aug. 15, 9 A.M. to 12 Noon

Meeting of Executive Committee

Address of Welcome.

Paper, Light and Power Accounting, by H. M. West, chief clerk Benton Harbor-St. Joe Railway & Light Company.

Paper, Bus Operating Costs and Accounting, by F. A. Healy, auditor Indiana, Columbus & Eastern Traction Company.

Paper, Activities of the Public Relations Department, by A. E. Scott, director of public relations Interstate Public Service Company.

1:30 P.M.

Reports of Committees.

General Business.

Saturday, Aug. 16, 9 A.M. to 12 Noon

Standardization of Forms, joint paper by members of the Freight and Express Committee.

Question Box.

A general oral discussion will be held following all papers and committee reports.

American Association News

City and Interurban Operation

A JOINT meeting of the committees on city operation and interurban operation of the American Association was held at St. Louis, Mo., on July 25. Those present were:

City Operation—H. B. Flowers, chairman; R. F. Carbutt and R. W. Emerson, regional vice-chairmen; C. S. McCalla and E. J. McIlrath. *Interurban Operation*—Harry Reid, chairman; John S. Bleecker and G. W. Welsh, regional vice-chairmen; D. W. Snyder, Jr. and H. A. Mullet. *Both Committees*—E. F. Wickwire, manufacturer representative, and G. C. Hecker, secretary. *Guests*—J. A. Greig, W. H. Sawyer and Maj. R. J. Lockwood.

The meeting was held at the Missouri Athletic Club through the courtesy of W. H. Sawyer, who arranged for the meeting room and for the committee luncheon.

The secretary announced that reports had been received from six regional vice-chairmen. Messrs. Carbutt and Bleecker read their reports and the secretary read the others. There was considerable discussion of the several reports and it was especially noticeable that there was practically no duplication, each regional vice-chairman having summarized his observations from a different viewpoint.

Discussing methods of presenting the reports of the two committees, the suggestion was made that a joint report be made instead of two separate reports, the principal advantages being avoidance of duplication and conservation of time at the convention. It was decided that a joint report should be made. It was agreed that the report should consist of an introductory section; reports of regional vice-chairmen; conclusions and recommendations. The Handbook of Modern Practices should be included as an appendix.

The data gathered by the regional vice-chairman will be presented in the "Handbooks on City and Interurban Practices." It was decided to issue each handbook this year in stencilled form only, and the secretary was instructed to forward one to each member of the association.

An editing committee for the final report was appointed, consisting of R. F. Carbutt and C. W. Kellogg of the city committee; J. S. Bleecker and G. W. Welsh of the interurban committee and G. C. Hecker, J. A. Greig and Morris Buck.

Messrs. Reid and Flowers suggested that the two committees be combined next year as the "committee on electric railway operation." They also suggested that the chairman be a vice-president of the American Association. It was agreed that such recommendations should be embodied in the report this year.

It was decided to recommend the appointment of one Canadian regional vice-chairman and two Canadian members at large.

The secretary announced that exhibit space had been set aside for these committees at the coming convention. A discussion resulted in the decision to ask Secretary Welsh to eliminate the exhibit as a separate feature and to incorporate in the Association's exhibit any material which the committees might want displayed.

Foreign Operation Committee in London

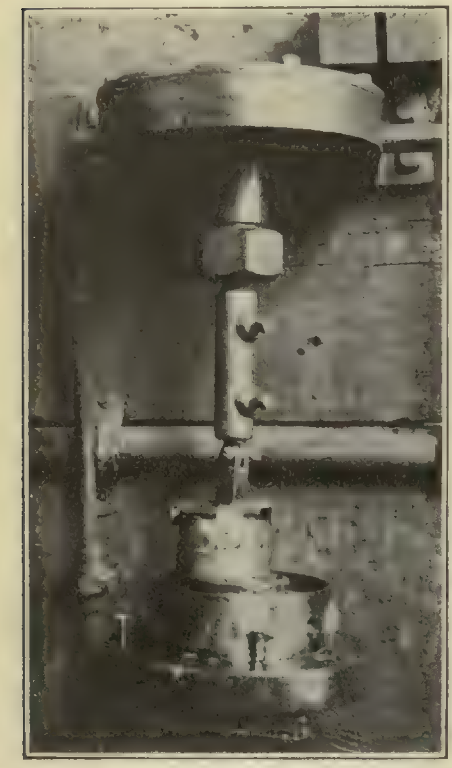
THE special committee on foreign operation of the American Association, consisting of Harley A. Johnson, James W. Welsh and Harry L. Brown, following its arrival in London on July 15, has devoted a considerable amount of time to a study of the London transportation situation.

Following two weeks spent on the London Underground system and the London County Council Tramways, the committee has arranged to visit important cities in the northern part of England and in Scotland. Following this trip, the committee plans to return to London Aug. 2.

Maintenance of Equipment

Air-Driven Valve Lapping Machine

Lapping in motorman's air valves is usually a long tedious hand operation which makes this work comparatively expensive. In the shops of the Denver Tramway, an air-driven machine has been designed for doing this work, and is found to accomplish it successfully.



This Air-Operated Device Laps Motorman's Valves Automatically

The machine consists of a home-made air turbine, shown at the top in the accompanying illustration. A shut-off cock in the air line to the turbine acts as a throttle to regulate the speed so that the rate of rotation is approximately that which would be obtained were the lapping carried out by hand.

On the shelf below, the lower part of the valve is placed in position and the upper valve member set on top of it, just as if the lapping were to be done by hand. Grinding compound is applied in the customary manner.

On the stem of the machine is a small casting having fastened to it a sheet metal piece made up with four projections as shown in the illustration. This is set at a slight angle to the axis of the stem, so as to give it a slightly eccentric motion, when the stem is rotated by the turbine.

The prongs on the bottom of the driving fixture are not bent down exactly at right angles, but are twisted slightly from a straight line drawn through the center of the stem. These prongs are not fastened to the valve in any way, simply straddling it. As they rotate with an eccentric motion they rub against the sides of the upper portion of the valve and cause it to move about over the face of the lower member. The rate of rotation of the valve is less than half of that of the prongs, due to the slipping which takes place between them. The combination of this slipping with the eccentric motion of the prongs themselves results in the top valve member moving over the bottom surface in very much the same manner as would be done by hand. The continually changing direction of motion prevents the formation of grinding marks and gives a resulting surface equivalent to that with hand lapping.

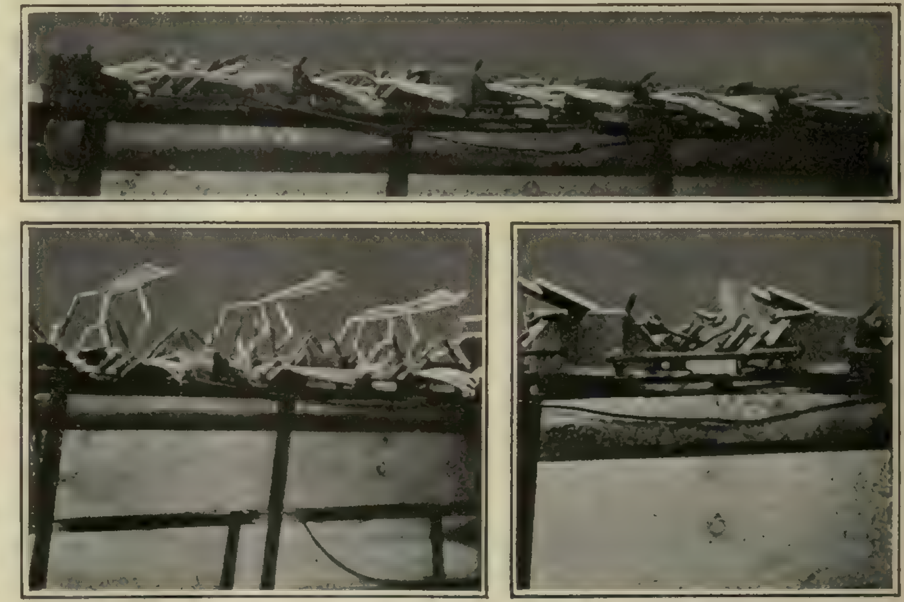
One of the men working on the air-brake repair bench takes care of placing valves in the machine from time to time, and while the valves are being lapped in he is engaged in other work at the bench.

Electrically Heated Coil Press

A novel form of coil press is in use at the St. Catharines shop of the Niagara, St. Catharines & Toronto Railway. This form of coil press, which was developed by the railway under the supervision of W. E. Massie, mechanical superintendent, is electrically heated and water cooled. The main part of the press is a hollow casting which contains an electric heating element for 500-volt direct current. Provision is also made for circulating water, which is supplied from a jet under the casting in the water receptacle.

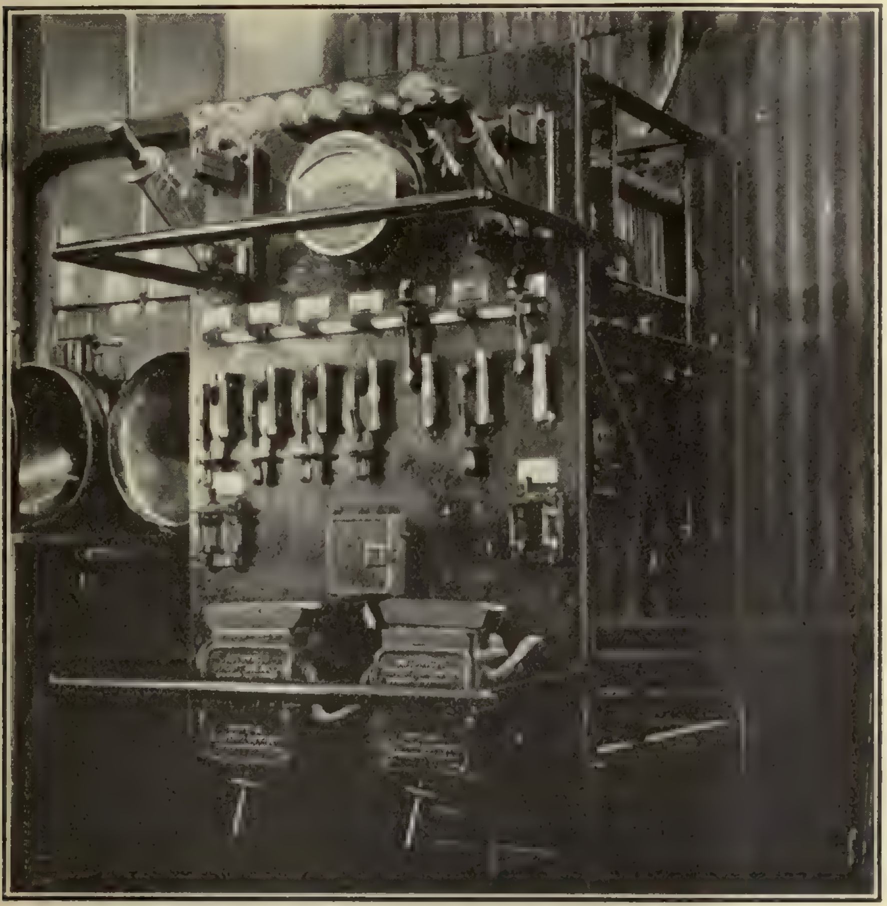
The press is designed so that it will take armature coils for all modern railway motors, including sizes from the GE 80 and Westinghouse 101-B up to the five-turn GE 240 coil. In practice, it takes about 20 minutes to heat the press and cool the coil. When the coil is removed all the wires are cemented together by the shellac between the layers.

A number of these presses have



This Coil Press Is Electrically Heated and Water Cooled

The empty press is shown at the lower right. In the view at the top coils are placed to obtain proper radius to fit the slots, and in the view at the lower left the coils are placed regardless of armature radius.



Automatic Circuit Breakers Are Tested by Shop Switch Panel at the Decatur Shops of the Illinois Traction System

been constructed by the railway, which has been using them with very satisfactory results. One of the illustrations shows the press empty. The levers for holding the coils in position and pressing them are shown. In the other illustrations are shown several coils in position in the presses.

Testing Circuit Breakers Under Load

AT THE Decatur shops of the Illinois Traction System every circuit breaker, whether new or rebuilt, is given a test before it is placed in service. The testing apparatus used consists of three heavy-duty quick-break switches, a standard circuit breaker and the circuit breaker under test all mounted on the face of a panel. On the back of the board are mounted sufficient standard motor resistor units to create the desired electrical load for testing. The main line switch, the circuit breakers and resistor units are connected in series on the 600-volt d.c. line with provision made in the wiring for imposing two different loads on the circuit breaker under test. These two conditions are taken care of by the two switches located in the upper right hand corner of the panel. An ammeter is also connected in series with the apparatus.

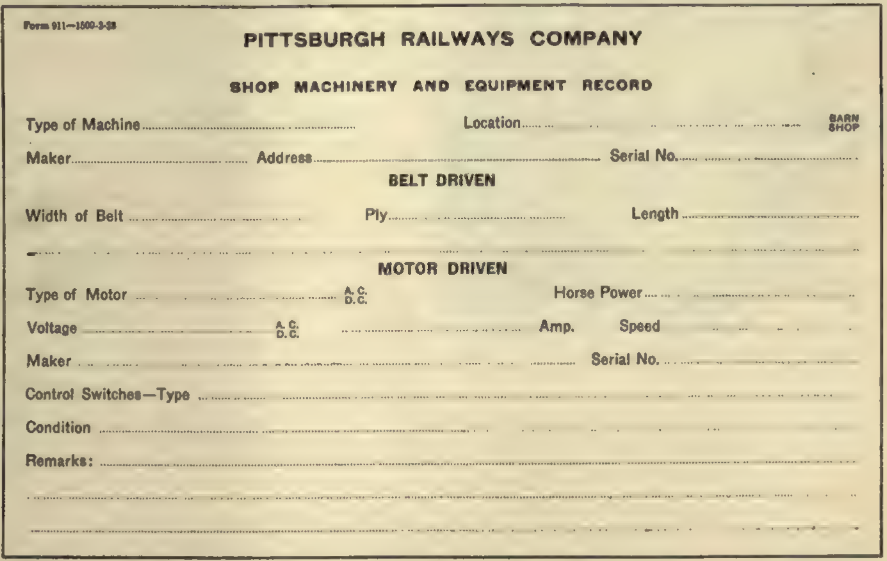
The circuit breaker under test is set to release at the proper current value. In turn the main line switch, the permanent circuit breaker and the control switch governing the amount of current are closed. If the circuit breaker does not release when the control switches are closed, the current reading shown on the ammeter is noted, the permanent circuit breaker is knocked out by hand and another adjustment made of the circuit breaker under test. The permanent circuit breaker placed in series for protection of the apparatus is set to release at an amperage of approximately 25 per cent above the normal rating.

As the railway has two types of circuit breakers, two control switches are installed to give the proper current for each type of breaker. When the heavy breakers are tested the permanent circuit breaker is set up so as to protect the line under these conditions. This apparatus was constructed by the electrical department of the shop and is mounted on the same panel as are the switches and fuses for the shop lighting circuit.

Keeping Records of Shop Equipment

RECORD cards are kept by the Pittsburgh Railways of all machinery and equipment located in the shops and car houses. This record is filed in the shop department office and is kept up by one of the engineers of that department. Cards such as shown in the accompanying illustration are used. They are of white cardboard, 8 in. x 5 in. Following an inventory a few years ago, the information obtained was placed on cards and since then these cards have been kept up to date by recording the changes in existing machines. A card is destroyed if the machine is scrapped and a new card is filled out when a piece of equipment is added.

If a shop machine is driven from



Form 911—1500-3-23

PITTSBURGH RAILWAYS COMPANY

SHOP MACHINERY AND EQUIPMENT RECORD

Type of Machine .... Location .... BARN SHOP

Maker .... Address .... Serial No. ....

BELT DRIVEN

Width of Belt .... Ply .... Length ....

....

MOTOR DRIVEN

Type of Motor .... A.C. D.C. Horse Power ....

Voltage .... A.C. D.C. .... Amp. Speed ....

Maker .... Serial No. ....

Control Switches—Type ....

Condition ....

Remarks: ....

....

....

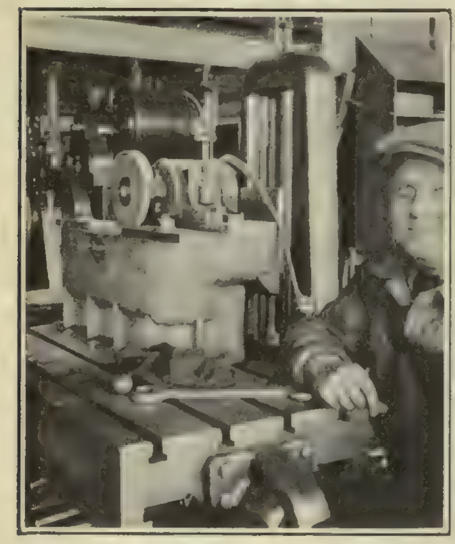
Card Used by the Pittsburgh Railways for Keeping Records of Shop Equipment the line shafting or countershafting the size and make of the belt to the machine is recorded. If, however, the machine has an individual electric motor, the space pertaining to the belt is disregarded and the data relative to the driving motor is recorded. This record system also applies to all equipment throughout the shop such as line shafting, welding outfits, power belts between line shafts, and power motors. Data are recorded on the face of the card and additional remarks are made on the back. With this method it has been found possible to purchase repair or replacement parts intelligently without the necessity of sending sample parts with the order.

Milling Machine Used as Surface Grinder

THE combination of a small portable grinder and a Lucas universal milling machine in the shop of the Department of Street Railways, city of Detroit, has been found very useful for a number of jobs which ordinarily would require a surface grinder.

One such job which is carried out efficiently on this machine, shown in an accompanying illustration, is the operation of finishing valve seats on the engines used for driving various automobile trucks on the railway property.

The worn valve seats are first welded and are then ground to a flush surface with the top face of the engine casting, so that after they have been re-seated the valves are again in first-class condition and ready for reinstallation.



A Portable Grinder Is Used for Surface Grinding in a Lucas Milling Machine

New Equipment Available

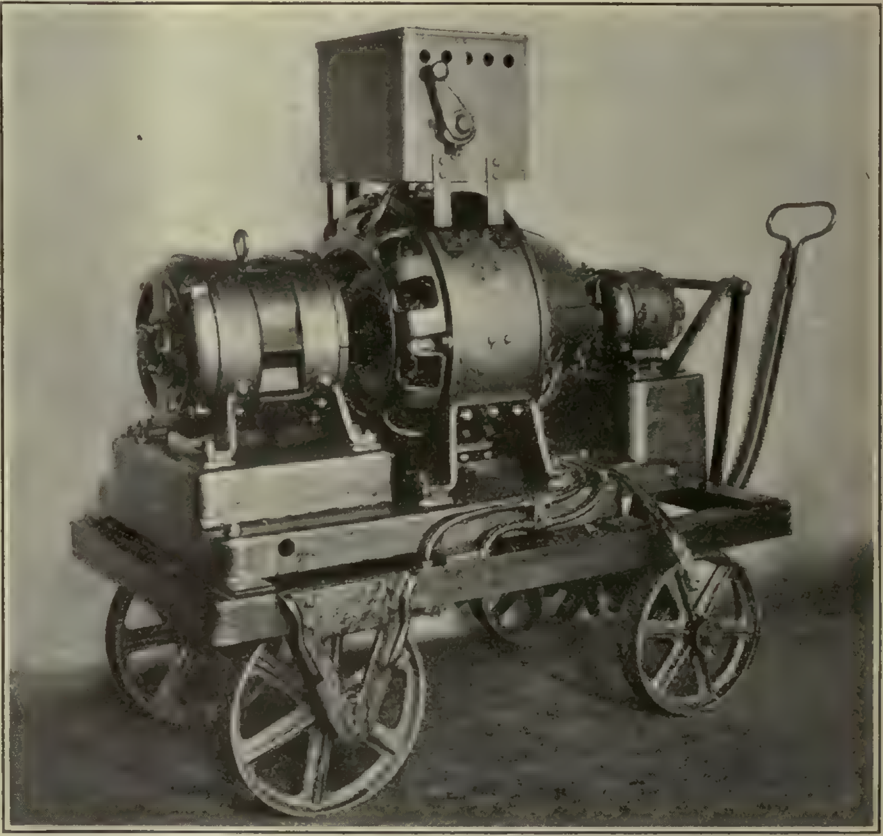
Compact Arc-Welding Set

A COMPACT, entirely self-contained, single-operated 200-amp. arc-welding set has recently been designed by the Westinghouse Electric & Manufacturing Company. This is available in either the stationary or portable form. The generator will deliver 300 amp. on intermittent work, but any welding current from 60 to 300 amp. may be obtained by operating the rheostat handle located outside the control cabinet on top of the generator.

The generator is designed inherently to stabilize the arc, thereby overcoming instantaneously any resistance fluctuations in the arc circuit, while at the same time the necessity for relays, solenoid controlled resistors, etc., is eliminated. Because of the special design of the generator, the operator can readily strike and maintain the arc, obtaining the necessary penetration and fusion for good welding. Any of the commercial sizes of metallic electrodes, from 1/16 in. to 1/4 in. diameter, may be used.

The generator and its driving motor are mounted on a common shaft to which the separate exciter is coupled by means of a special flexible coupling. Ball bearings are used throughout to eliminate the leakage of oil when operated on inclined positions.

The driving motor is of standard Westinghouse construction and may be either a d.c. type SK motor or an a.c. type CS squirrel-cage motor, depending upon the character of the supply service. Alternating-current driving motors may be used on 220- and 440-volt supply circuits simply by rearranging the lead connections.



Portable 200-Amp. Arc-Welding Apparatus

Alternating-current motors are started by connecting them directly to the line through a safety switch. Direct-current motors are started by means of a type D starting rheostat. In both cases, all the operating mechanism except the handle is within the control cabinet, eliminating danger of contact with live parts. An ammeter and a voltmeter, if desired, are mounted on the cabinet.

The rugged construction of the unit makes it particularly adapted to railway shops and similar places where welding equipment receives rough usage. The truck is sturdy and is equipped with roller-bearing wheels so that it can easily be hauled by one man.

The News of the Industry

Buses for Oakland

Agreement Reached Under Which Key System Transit Will Start Feeder Service on Short Lines

Definite progress toward the improvement of railway service in Oakland, Cal., was made on July 22 at a hearing before President Clyde L. Seavey of the Railroad Commission. That day the Key System Transit Company agreed to install three bus lines to connect with existing railway lines in East Oakland; one on Thirty-fifth Avenue, one on Seminary Avenue, and a line commencing at Ignacio and Trask. These bus routes are to be started as soon as a permit can be obtained from the city of Oakland.

It was agreed at the hearing that there should be a 6-cent fare on these bus routes, with transfer privileges to connect with street car lines. Representatives of the company, the city and the Railroad Commission agreed at the hearing that a further and complete investigation of the transportation system should be carried on under the supervision and guidance of the engineering department of the Railroad Commission.

The agreement is really the fruition of a traffic survey which has been in progress for the past four months by an expert for the city in conjunction with Richard A. Sachse, who has been acting for the Key System Transit Company.

W. R. Alberger, vice-president and general manager of the Key System Transit Company, stated that the buses have been ordered and the routes mapped and that it is now merely a question of official sanction.

Mr. Sachse declared that the three proposed lines will represent an investment of about $45,000; that the estimated total net revenue will approximate $37,000 yearly, and that the operating expenses will be in the neighborhood of $72,000, leaving a deficit of $35,000. He said:

> I believe that in spite of this loss to the company operation of the lines should be undertaken because this loss is not anticipated to exist always. In a few years the extensions should at least justify themselves to the point of carrying their own operating expenses.

C. O. G. Miller, president of the Key System Transit Company, made this statement:

> It will be noted by the official figures presented to the commission by our engineers that the proposed routes will be losing ventures for the company, but they will undoubtedly be valuable investments for the districts they serve. Transportation should be regarded as an investment for the community and as such is usually worth many times what it costs. But with the existing patronage these routes cannot pay any return to the company.

The three routes proposed are in the outskirts of East Oakland, a section that is experiencing rapid growth. The first route has a round trip mileage of 2.8 miles and a running time of seventeen minutes for round trips with a twenty-minute headway from 6 a.m. to 11 p.m. One bus will be required.

Route Number 2 has a 6.10 mileage with a fifteen-minute headway. Two coaches will be required on this schedule.

Route Number 3 has a 6.16 mileage and a fifteen-minute headway and will also require two coaches.

Transfers to regular lines will, of course, be given.

The five coaches for use on these lines, if the official approval is forthcoming, will be built in the Oakland shops of the Fageol Company. They will be of the same type as the famous city bus "Rosalie," which was run by Oakland in competition with the traction company at a loss during the two-man car war a few months ago.

The next step in the traffic survey will be consideration of Oakland crosstown lines. Engineers for the company and the city have had a conference on this matter and will probably make recommendations in the matter at the next hearing before State Railroad Commissioner Clyde Seavey. This has been set for the morning of Sept. 12 at Oakland.

The adjustment of the East Bay traffic problem is now well under way. Feeder bus lines have already been established in Alameda, and it is probable that the Oakland lines will be in operation by fall.

Employees' Contest in Salt Lake City

In the interest of improved service to the public, from whom it hopes to gain increased patronage, the Utah Light & Traction Company, Salt Lake City, Utah recently conducted a contest to be participated in by its employees. Fifty dollars in gold was offered in four prizes, $20, $15, $10 and $5 respectively for the best answer in 300 words to the question: "How can I secure twenty more fares a day for my company?"

Marked interest was displayed, many employees submitting answers to the question.

The answer which won first prize was submitted by Conductor Mark C. McDaniel. He said in substance:

> Show more courtesy; make riding a pleasure: do not leave end of line and time points ahead of scheduled time; show the people that we want their patronage, and that they cannot ride their automobiles to and from work as cheaply as they can ride the old reliable street cars. Handle your car with care. Watch every street you cross for prospective passengers and if you see anyone making an effort to catch your car, wait for him. Watch the fare box and transfers closely. Make friends, not charity riders. Take an interest in your work, or make room for someone else. Do not knock, but boost the company of which you are a part.

Safety Congress Meets

Legislation Adopted in Ohio Looking Toward Elimination of Highway and Grade Crossing Accidents

War against traffic accidents in Ohio was started in Columbus on July 23 when a permanent organization was perfected of the Ohio Committee for the Prevention of Grade Crossings and Other Highway Accidents. A. E. McKee, editorial writer for the Ohio *State Journal*, Columbus, was named chairman of the permanent committee and James B. Dugan, secretary of the Ohio Utilities Commission, was chosen secretary. Formation of the permanent organization was the outgrowth of a conference of representatives of railroads, electric railways, auto clubs and bus operators, called by Gov. A. V. Donahey, which met in the Senate chamber in the State House. Detailed arrangements for the Congress were left to a committee composed of Arthur V. Bland, director of public relations of the Indiana, Columbus & Eastern Traction Company, and other prominent men, including officials of the railroads and the organizations operating buses.

Provision was made for holding a similar conference annually and cooperation was promised by Governor Donahey in recommending to the next Legislature the findings of the conference. These included recommendations that auto drivers in Ohio be compelled to undergo tests as to their fitness to operate motor cars and that their licenses be subject to revocation for cause.

Other resolutions adopted by the conference included recommendations for elimination of grade crossings in an orderly and expeditious manner, avoidance of crossings wherever possible, co-operation of the state highway department and local political subdivisions in relocating highways that cross and recross railways with the view of eliminating all unnecessary crossings, enactment of laws authorizing the utilities commission, or other public authority, to require the removal of unnecessary obstructions to the view of the traveling public and to prevent the creation of new obstructions on property in the immediate vicinity of railroad crossings, enactment of "Stop, Look and Listen" legislation requiring drivers of all vehicles to come to a complete stop when approaching an unguarded grade crossing, use of colored lights, signals and signs recommended by the safety first committee of the American Railway Association, reporting of all motor vehicle accidents to proper authority for statistical and other purposes, a thorough system of education in schools in regard to accident prevention, and a development of public interest in every way possible in the elimination of grade crossing accidents.

It was resolved also that the committee confer with similar organizations in other states to promote the work and attempt to bring about a system of uniform laws, signs and warnings in the various states.

A committee composed of representative men in the railroad, railway and automobile fields was appointed to draft legislative proposals based on the resolutions adopted at the conference. Included on this committee was Fred Coen, general manager of the Lake Shore Electric Railway, Cleveland. The proposals will be submited to Governor Donahey.

Wage Hearings in Boston Scheduled

Public hearings will be held, probably in the State House at Boston, on Aug. 13, 14, 15, 25, 26, 27, 28 and 29 by the special board which has been selected to arbitrate the wages and working conditions on the Boston Elevated Railway system. Judge John D. McLaughlin of the Suffolk County Superior Court has been agreed upon as the chairman of the board. His associates will be James H. Vahey for the union and Charles W. Mulcahey for the company. Messrs. Vahey and Mulcahey will act both as counsel in the presentation of evidence and as arbitrators in voting upon the final award, and Judge McLaughlin will be the neutral member of the board, his to be the deciding vote. The men ask an increase in pay from the present maximum of 70 cents to a maximum of 95 cents an hour. The company has made a counter proposition that the men accept a reduction of 5 cents an hour from the present maximum.

Thirty-six Hurt in Long Island Accident

One person was killed and thirty-six others were injured during the evening rush hour on July 30, when three cars of a Long Island Railroad train left the rails. The accident is attributed to hasty opening of a switch in the Sunnyside Yards at Woodside. One of the cars that left the rails was hurled against an electric locomotive standing on an adjoining track. It was in the impact of these vehicles that so many persons were hurt. A statement made by the Long Island Railroad explaining the cause of the accident is as follows:

> At 5:31 o'clock, Long Island Train 466, while passing a Pennsylvania Railroad electric engine, at Tower H, in the Sunnyside Yards, Long Island City, had the hand switch thrown on car No. 7, which was third from the rear. As a result, a car of the electric train grazed the electric engine, causing the car to be thrown on its side. Cars No. 7 and No. 8 of the passenger train were derailed by the force of the collision with the overturning engine.
>
> The electric engine had stopped at a clearance point on a westbound track. At the time of the collision James J. Moore, a helper on the electric engine, had descended to the ground and was standing near a hand switch at the clearance point when the ten-car passenger train approached. Moore is reported to have turned the switch before the ten-car train had passed entirely over the frogs, causing cars 7 and 8 to collide with the electric engine.

Director to Have Control of Cincinnati Properties

Tentative clauses by which the Cincinnati Street Railway, Cincinnati, Ohio, places virtually complete control over the maintenance and operation of the system in the hands of the Director of Street Railroads has been agreed upon by representatives of the Cincinnati Street Railway, Cincinnati Traction Company and city officials, who are drafting a new traction franchise. While agreeing to these clauses, the traction representatives obtained protection for their interests in two reservations mutually agreed upon. They are that no order of the Director of Street Railroads shall be of such character as to raise the cost of operation so high that a return of 6 per cent cannot be made upon the property and that no orders be issued that would keep the company operating the system from maintaining its property and plant in a proper manner.

The object of both sides is so to draw up the ordinance that the responsibility would rest with the Director of Street Railroads. For that reason, authority over all changes in schedules, stops, routes, tracks or equipment will be vested in the director in the tentative draft of the franchise. These steps mark the first radical departure in the proposed provisions of the new ordinance from that of the present franchise, in which the powers of the Director of Street Railroads is limited.

Another development was the agreement providing for the eventual use of motor buses, trackless trolley cars or other modes of transportation by the street railway company. It was agreed that the franchise should run for twenty-five years. Provision for other modes of transportation by the operating company was made because it was believed that in the future the city probably would require rapid extension of the electric lines, which thus would be provided for. It was decided that in the event of disagreement arbitration would be resorted to and that such tribunal would consist of three members, one to be named by the city, one by the railway and one by the Board of Sinking Fund Trustees.

Philadelphia to File Formal Protest Against Increased Fare

Since the filing of the 8-cent fare tariff with the Public Service Commission, the Philadelphia Rapid Transit Company, Philadelphia, Pa., has become the target of much complaint and criticism, including a formal protest by the city of Philadelphia against the proposed advance in rates. Reference to the company's statements and the letter sent to Mayor Kendrick by Thomas E. Mitten calling attention to the expected loss in income in 1924 was made in the ELECTRIC RAILWAY JOURNAL, July 26, 1924. In its new tariff seeking to establish an 8-cent fare, with two tickets for 15 cents, the company announced its plan for improving service and for a system of 5-cent fare zones to be put into effect on its suburban lines.

Mayor Kendrick, on July 24, requested that City Solicitor Gaffney co-operate with the Department of City Transit in preparing and filing a formal protest against the fare increase. In this communication he said that although the people appreciate the efficient management now operating the Philadelphia Rapid Transit Company lines and are willing to pay proper compensation for the service rendered, they are at the same time unwilling to accept added burdens in the form of increased carfares without being satisfied that such increases were absolutely necessary in order to maintain good service.

W. D. B. Ainey, chairman of the Public Service Commission, said that a public hearing in regard to the matter would be held on Sept. 2.

New Bus Service for Hartford

A new bus line is to be established at Hartford, Conn., by the Connecticut Company. It will start at Pearl Street and operate along Allyn Street, Asylum Street and Woodland Street. Transfers will be valid from trolleys or inbound or outbound buses of the company, if used at Asylum and Trumbull Streets and Pearl and Trumbull Streets.

Bus Company for Brooklyn Chartered

The Brooklyn Bus Corporation has been formed to own and operate buses for the Brooklyn-Manhattan Transit Corporation. The certificate of incorporation was filed with the Secretary of State on July 24 and the County Clerk of Kings County on July 25. The officers of the new company are W. S. Menden, president; Travis H. Whitney, vice-president, and F. C. Marston, secretary and treasurer. The incorporators of the new company and its directors for the first year are Gerhard M. Dahl, W. S. Menden and Travis H. Whitney. It is understood that the active direction of the bus company will be under Travis H. Whitney, vice-president. As stated in the certificate of incorporation, the purpose of the new company is:

> To purchase, lease or otherwise acquire automobiles, taxicabs, or other motor vehicles of every character and to operate and conduct a general livery, taxicab, sightseeing and motor vehicle service for the carriage and transportation of persons and property for hire, but not for the purpose of establishing, maintaining and operating any stage or omnibus route or routes.

This is in line with the statement made in the ELECTRIC RAILWAY JOURNAL for July 26 that the buses will not be operated on definite routes, unless the public authorities deem it wise to sanction the operation of bus lines, and that pending such authorization the buses will be used for livery service.

The first of the buses was expected to arrive by Aug. 1. The company already has a number of applications for use of buses by special parties going to the various beaches. Several civic organizations have also suggested various routes which in their opinion should be operated as bus lines. This is taken as an indication that the readiness of the B.-M.T. to render bus service, if public authorities approve, has been well received by the public.

Chicago Surface Lines Franchise Does Not Permit Buses

Operation of buses as feeders to the street car lines in Chicago is not permitted under the terms of the existing franchise, according to the city law department.

Assistant Corporation Counsel Doty recently stated that the present franchises do not permit such auxiliary operation, and that an amendment to the franchise of the Chicago Surface Lines would be necessary before such operation could be undertaken.

Due to the rapid expansion of the territory included within the corporate limits of the city, demands for extensions of various car lines are made continually. Under the terms of the original franchises the companies were required to build a certain number of miles of new extensions each year. This requirement became one of the elements in the controversy over changes in the rate of fare during Mayor Thompson's administration, and the subject has not yet been entirely settled. If the opinion of Mr. Doty is correct, the Surface Lines will be unable to utilize buses for service in outlying sections of the city without special action by the City Council.

Buses Running in Oskaloosa

Bus service is being given a trial in Oskaloosa, Iowa, by the Oskaloosa Traction & Light Company over the routes of trolley lines which have been operated at a loss.

Special permission was granted the traction company by the City Council to operate the buses over a ninety-day period to test the desirability of motor transportation in certain parts of the city.

Two White cars with Champion de luxe coach bodies, identical with the buses operated by the Illinois Power & Light Company, have been put into service. The coaches are running over the route covered by the east end car besides serving the west end with new service over a loop that extends to the entrance of the southern Iowa fair grounds.

Manager J. H. Porter of the traction company is authority for the statement that no attempt will be made to replace the entire trolley service with buses, but only those electric lines that have not been paying. The resolution of the City Council authorizing bus operation was referred to in the ELECTRIC RAILWAY JOURNAL, issue of June 7, 1924.

Popularity of Interurbans in Ohio Growing

It cost almost $3,000,000 more to operate the interurban electric railways in Ohio in 1923 than it did the previous year, according to annual reports of the companies just compiled by the State Public Utilities Commission.

At the same time taxes of the interurbans were increased, and it is revealed that only fourteen of the sixty-three companies declared dividends.

The total operating expenses of the interurban lines last year were $25,971,219, an increase of $2,820,248. Taxes amounted to $2,719,585, an increase of $220,288. As these charges were mounting, revenues increased $1,315,863, to a total of $31,363,857.

More people are riding the interurbans, however, the reports show. A total of 234,047,833 passengers were carried, an increase of 18,550,247. There was an increase, too, in the amount of freight business.

Mileage operated by the Ohio interurbans was 2,729, an increase of a little over 7 miles over the year before.

The total investment of the companies was $212,634,738.

While expenses increased, the combined reports show that the interurbans are gradually being placed upon a sounder basis and that their popularity is growing, both as to passengers and as carriers of freight.

Railway's Answer Filed in Labor Suit

An answer to the suit brought recently by the street car men's union at Cleveland, Ohio, in an attempt to force a wage increase and bring about continued recognition of the union has been filed by the Cleveland Railway in Common Pleas Court there. The company admits having signed the agreement with the men in 1906, but charges that the contract is now null and void because it provides that no person shall work for the railway as a motorman or conductor for more than sixty days unless he makes application for membership in Division 268; that it is void because of the provision that the railway shall discharge any motorman or conductor, no matter how careful or competent he may be, unless he continues his membership in Division 268; that it is void because of the attempt of Division 268 to delegate the duty resting on the defendant to discipline its men to an "irresponsible and unauthorized" board of arbitration.

The answer further says that the 1906 agreement is now unenforceable because it is "indefinite, uncertain and without any limitations as to its extent or duration, and is in effect only an agreement to make a further agreement"; that it is void because it does not obligate or require any member of Division 268 to remain in the employ of the railway for any period whatever.

The answer sets forth that Charles Higley, one of the arbitrators who handled the case during the recent threatened strike, had withdrawn from the arbitration and would have nothing more to do with it and that Mr. Higley's withdrawal was in itself a revocation of the submission of the entire question.

It is further charged that James W. Holcomb, another member of the arbitration board, was "prejudiced and biased."

The answer further says that the "alleged agreement" provides that either party will, at the request of the other, meet and consider changes in the "pretended agreement" and that the railway notified the union of such a desire, set a date for the meeting and the union men refused to meet the railway officials. It is charged that this was a further violation of the agreement.

Bus Deal in St. Louis Off

John A. Ritchie, president of the Omnibus Company of America, holding corporation for the St. Louis bus lines, says the deal for the sale of the local bus lines to the Newman committee, seeking to reorganize the United Railways, is off. The deal is said to have fallen through because holders of the St. Louis Transit Company bonds declined to submit to an assessment to raise the $2,400,000 asked for the bus lines. Mr. Ritchie has informed E. R. Kinsey, president of the St. Louis Board of Public Service, that the bus lines will remain under the present ownership, and he gave assurances that any new bus lines opened up in St. Louis would be permanent.

The Board of Public Service of St. Louis on July 15 postponed until July 28 final action on the application of the Peoples Motorbus Company for permits to open six new lines. Postponement was decided on when R. J. Lockwood, assistant general manager of the United Railways, informed the board that Col. Albert T. Perkins, general manager, is taking his first vacation in five years and would not return to St. Louis for ten days, and desired to be heard on the matter before final action was taken on the bus permits. It has been estimated by United Railways officials that the four bus lines now in operation take an average of $2,000 daily from the street cars.

Prior to the decision of the board for delay, Clinton H. Fisk, director of streets and sewers, announced that he would recommend the issuance of the six permits sought, increasing the bus route mileage about 45 miles. He stated that he had reached an agreement with President Meade for provisions in the new permits guaranteeing permanency of the lines.

Frank Carter, acting as counsel for the bus company, informed the board that the delay in granting the permits had held up the company's plans for constructing a $200,000 garage and purchasing additional buses. At present the company is operating eighty-five buses, including three single-deckers. This number would be increased to 200 soon after the new permits are granted, the board was informed.

Col. Albert T. Perkins, general manager for Receiver Rolla Wells of the United Railways, is opposed to the opening of bus lines that are not supplemental to the existing railway lines. He said the board should not permit duplication of transportation facilities. Mr. Perkins attended the meeting on July 11, but left prior to the discussion of the bus permits. He has stated that the United Railways has not changed its attitude toward the buses.

$2,000,000 Bus Project in Prospect

The Twin City Rapid Transit Company, Minneapolis, Minn., it is reported, plans to invest $2,000,000 in a comprehensive bus project to serve its suburban communities. The original expenditure calls for a sum of $500,000 for the purchase and operation of fifty buses.

Aroostook Valley Railroad Seeks to Build Extension

Permission to build a 27-mile extension has been asked of the Public Utilities Commission of Maine by the Aroostook Valley Railroad, Presque Isle, Me. The proposed line would go from New Sweden to St. Agatha. A careful survey has been made of the ground and engineers estimate that the cost of construction would be about $26,000 per mile. The steepest grade to be encountered would be 2 per cent, and in only two places would bridges be necessary. The estimated total cost of construction is approximately $700,000, and an additional $100,000 would be spent for equipment.

If the extension is permitted it will open up a large tract of valuable timber and potato country in Aroostook County. The greater portion of the new road, as laid out, will pass through timberland except the northern end near St. Agatha. In this section the land is mostly cleared but is not intensively cultivated. Testimony was given at the hearing regarding the present difficulty of lumber and logging operations. Much of the lumber cut in this territory has to be rafted down the lake, and when the logs are sent down the boom has to be broken at the small rivers which connect the lakes. Potato growers also testified that the building of this extension would greatly increase their business. It is said that where the haulage is more than 5 miles the crops cannot be profitable, and with the new road the haul from St. Agatha and nearby villages will be shortened to about 3 miles. The present haul is between 9 and 17 miles.

The Bangor & Aroostook Railroad protested against the granting of the application, on the ground that it would parallel its steam railroad lines between New Sweden and Stockholm. This company claims that the present facilities are sufficient to take care of all of the business. Final decision has not yet been made by the commission.

Subway Plan for St. Louis Outlined

Plans for a subway system costing upwards of $50,000,000 forming a net work of underground tracks in the loop district down-town and an extended elevated system connecting remote parts of St. Louis were discussed before members of the transportation committee of the Board of Aldermen by C. E. Smith, consulting engineer for the city, at a meeting of the committee on June 26.

The committee was appointed by President Neun of the Board of Aldermen to study the city's transportation problems and endeavor to solve them. The members during the next few months will visit other cities, principally New York, Boston, Chicago and Cincinnati, to investigate transportation methods.

Mr. Smith outlined a plan for a subway from Eighteenth Street to the river and between Washington Avenue and Market Street with an elevated system west of Eighteenth, and northward from Washington Avenue and south from Market Street. He estimated the cost of subway work at $5,000,000 a mile and the elevated at $1,000,000 a mile.

He expressed the belief that the most equitable way of paying for the improvement would be to assess one-third against patrons in increased fares, one-third against the owners of adjacent property and one-third to the city.

He pointed out that 300,000,000 passengers yearly are handled by the transportation system in St. Louis and that a 1-cent increase in fare would pay 6 per cent interest on $50,000,000, the estimated cost of the subways and elevated lines.

Wants Jitney Ordinances Suspended in Northampton

The Massachusetts Public Utilities Department has been petitioned by the Northampton Street Railway to suspend the jitney ordinances in the city of Northampton. Under these ordinances jitneys may run on any of the streets in the city. The railway maintains that they should not be permitted to operate in streets through which the tracks of the company extend.

The official attitude of the city, as expressed by the city solicitor, is that the ordinances should not be changed, that practically every main artery of travel through the city is occupied by the railway and the jitneys would be crowded out if the company's appeal were granted.

It is argued by the jitney interests that the state authorities should not interfere with the rules of the city authorities unless it is proved that their regulations are a public injury; that the jitneys purpose to do a through business between Springfield and Greenfield and ought to be permitted to get their share of the Northampton business.

Ten Cents in White Plains, N. Y.

The Public Service Commission granted an order July 25 authorizing Leveritt S. Miller, as receiver for the Westchester Street Railway, to increase the fare to 10 cents in two zones on the Mamaroneck Avenue line in the city of White Plains, N. Y. On June 25 the commission approved a fare of 10 cents on the Tarrytown, Silver Lake Park and Scarsdale lines, but decision on the Mamaroneck Avenue line was deferred pending consideration of legal questions as to the effect of franchises granted to the applicant's predecessors by the town of Harrison and the village of Mamaroneck. The increased fare is effective to Dec. 1, 1924.

The order of the commission provides that the receiver shall issue transfers without additional charge to passengers boarding cars in Zone No. 1, which shall be good on any line operated by the receiver.

The commission held that the franchises granted by the town of Harrison and village of Mamaroneck do not control the rights of the company with the consent of the city of White Plains to charge such fare as may be proper upon the Mamaroneck Avenue line within the city, nor do they restrain the commission from allowing the increase asked.

Toledo Property Barred from Ousting Interurban

The Detroit, Monroe & Toledo Short Line Railway was granted a temporary restraining order in Common Pleas Court at Toledo, on July 25, barring the Community Traction Company, Toledo, Ohio, from ousting the interurban from the city tracks, as had been threatened. For several months there has been a dispute over the city track rentals. The interurban has withheld payments for tracks and power since March 1. The amount now accumulated in rentals past due is about $24,000, it was brought out at the hearing. Several other lines have followed a similar plan of combating the rates. Rate now charged is 36 cents for heavy cars and 27 cents for lighter cars.

When the first contract was made with the interurban companies it provided for annual opening of the rate matter and named a plan for the selection of a board of arbitration in case of disagreement. This board would consist of three members—one to be appointed by the interurbans, one by the traction company and a third by the Court of Appeals.

The Milner ordinance provides for setting rates for interurbans and names an arbitration plan which includes a representative of the city, of the company and a third to be selected by the federal court. It specifies that the interurban railroads may have representatives present at this type of arbitration. Hearing will be held by the Common Pleas Court in September to determine which form of arbitration governs the case. The court has also been asked to name a fair rate.

The Maumee Valley Line has kept clear of arbitration by maintaining the validity of an old contract through non-acceptance of the Milner ordinance. It pays on a passenger basis for use of tracks and claims that the lease which it holds is a perpetual one.

New Road Proposed for Kentucky Coal Fields

A new power development is in sight at Owensboro, Ky., in connection with the incorporation of the Owensboro, Rockport & Chicago Railroad if the Interstate Commerce Commission approves the plan to build a bridge across the Ohio River, at Owensboro, and 84 miles of electric railway to Elnora, Ind. The company plans to build a line that will connect at Elnora, Ind., with the Chicago, Milwaukee & St. Paul Railroad, and at Owensboro with the Illinois Central Railroad, Louisville, Henderson & St. Louis Railroad, and Louisville & Nashville Railroad, giving a new Ohio River crossing, and a fresh connection to the Western Kentucky coal fields. Officials of the road are E. T. Franks, president; D. C. Stimson, vice-president, and E. W. Smith, secretary. Lawson Reno, head of the Central Trust Company, largest bank in Owensboro; R. W. Owen, Gleeson Murphy, E. T. Franks and D. C. Stimson are directors. The City Commissioners of Owensboro have already granted right-of-way through the city, and it is reported that options have been secured on right-of-way through the county.

Wants Bus Operation Curtailed in Toledo

With the fare stabilizing fund exhausted the Community Traction Company, Toledo, Ohio, is to be financed through the period of deficits by Henry L. Doherty & Company. This is the plan recently laid before Mayor Brough and the City Council. No dividends will be paid by the Community Traction Company, on its preferred stock, of which $1,000,000 is held by the Doherty interests. Some of this stock was sold to citizens of Toledo and on this checks will be forwarded by the Doherty company at regular dividend periods, but the stockholders will be asked to assign their dividends to the Doherty company.

Mr. Doherty also told President B. C. Adams that the extraordinary maintenance charge of $15,000 should be continued despite the bad business period. He agreed to furnish that amount to rehabilitate the property. Economy plans are now before the Council.

The Doherty company proposal was made in a letter in which Mr. Doherty asked that bus competition be curtailed. The buses are understood to be cutting into the receipts of the railway to the extent of $100,000 a year.

Franchise in Illinois Will Be Resubmitted

It is expected that the proposed twenty-year franchise for the railway lines of the Illinois Power Company, Springfield, Ill., defeated at the election on April 8, will be resubmitted to the voters at a special election. In a letter to General Manager Mackie of the company, S. A. Bullard, Mayor, states that the majority of the Council favor submitting the franchise with some modifications in order that the city may not be interrupted in its street improvements and may have the necessary co-operation of the company.

The most important change contemplated in the franchise ordinance is the removal of the clause giving the company the right to operate buses. The Mayor said that the bus question did not come within the jurisdiction of the city; that permission must come from the State Commerce Commission. Some of the provisions of the original franchise weere referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 22.

Another Maine Decision Protects Existing Utility

The Public Utilities Commission of Maine recently dismissed the application of the Checker Cab Company to run buses between Portland and Old Orchard, Me. The commission states that the public in this vicinity is being adequately cared for at reasonable rates.

The Cumberland County Power & Light Company operates a line from Portland to Old Orchard. The commission in its decision states that the manager of that company testified that the Old Orchard line was not remunerative and that the directors of the road would gladly discontinue service if allowed to do so. He further asserted that much of the traffic to Old Orchard at times other than the active summer resort season was from school children. The commission said that their plight had to be considered in the event of the discontinuance of the Old Orchard branch.

The finding stated that the situation presented a question similar to that considered at length in the commission's decision of last August when it rejected the petition of the Portland Taxicab Company and others to run buses between Portland and Old Orchard.

The commission also stated that its function was not merely supervisory and regulatory as the petitioner had contended. Further, the commission ruled that the spirit of the Maine laws protected an existing utility from an invasion of its field without the consent of the commission and that in its opinion the policy of the state was to build up a structure of transportation which might be co-ordinated with the existing system.

A somewhat similar decision with respect to traffic to Old Orchard, rendered about a year ago, attracted wide attention because of the views expressed by the commission at that time.

West Chester Property Seeks Eight-Cent Fare

In a four-page letter which was distributed on July 28 to the passengers of the Philadelphia & West Chester Traction Company, Philadelphia, Pa., A. Merritt Taylor, president, presented figures to show that increases in the cost of materials, labor and wages, together with the addition of new facilities and the decrease in passenger traffic for the first five months of this year, as compared with the first five months of 1923, make necessary an advance to an 8-cent cash fare. He filed notice with Public Service Commission stating that the decrease in earnings was due largely to the privately owned automobiles.

The new rates proposed were authorized at a meeting of the board of directors on June 25. The basis is an 8-cent cash fare per zone, with tickets in strips of four for 30 cents and six for 45 cents. These rates, according to Mr. Taylor, will compare with rates that were established long ago by other companies, most of them in 1920.

In his letter Mr. Taylor states that the operating expenses for the first five months of 1924 increased $33,893, or at the rate of $6,779 a month. Further, comparison of fares collected and car-miles operated during the first six months of 1924 with the first six months of 1923 shows that the number of fares collected during this six-month period increased only 2.89 per cent and that car-miles operated increased 7.15 per cent during May and June compared with similar months of last year. He said that in order to borrow large sums of money needed for recent capital expenditures the company had to pay more than 6 per cent per annum, whereas under pre-war conditions the company sold its 4 per cent general mortgage bonds at 90 per cent of par, which subjected the company to a charge of only about 4½ per cent for new money required.

Parking Ordinance in Los Angeles Being Drafted

The City Council of Los Angeles, Cal., recently approved the ordinance covering the recommendations of the special parking survey committee. The work of drafting the ordinance for enforcement has already been started. Besides prohibiting parking between 7 a.m. and 6.15 p.m. on eleven downtown streets, the ordinance also prohibits the parking of all sightseeing and sales promotion cars in congested districts between 7 a.m. and 6.15 p.m., and will reduce all parking periods from the present 45-minute limit to 30 minutes for private vehicles and increase the limit from 15 to 29 minutes for commercial vehicles.

Although there were many protests against the new restrictions, proponents of the report declared it was the best move possible to meet the emergency situation of the congested traffic. The majority of the protests were on the ground that certain streets were designated for no parking instead of having a blanket no-parking rule for the entire downtown district. It was explained that certain streets were put under the no-parking ban in order that no one place of business in the downtown district would be more than a block away from where an automobile might be parked.

The parking survey committee was created by the Council last year and submitted its report early in the current year. The recommendations of the members were referred to in the ELECTRIC RAILWAY JOURNAL of May 10, 1924.

Wisconsin Institute May Publish New Journal

The *Journal of Land and Public Utility Economics* is in prospect for publication in February, May, August and November, by the Institute for Research in Land Economics and Public Utilities. The new publication will be edited by Richard T. Ely, director of that institute and professor of economics in the University of Wisconsin. In a statement as to the purpose of the *Journal*, Professor Ely says that it will be devoted to economic aspects of the utilization of the land and the regulation and administration of public utilities. In addition to leading articles there will be sections in each issue which will chronicle the comment upon the latest and most important legislation and court decisions relating to land and public utility economics; summaries of the results of research and experiment, and a review and criticism of current literature in the field.

Professor Ely says that if the response to the announcement is sufficiently encouraging, the A. W. Shaw Company will publish the *Journal*, and has agreed to pay to the Institute the net profits in each year, these profits to be applied by the trustees of the Institute to the support of further research in the field of land and public utility economics. The yearly subscription rate will be $5. Correspondence should be directed to the A. W. Shaw Company, Cass, Huron and Erie Streets, Chicago.

News Notes

Uniform Rates in Connecticut.—The Connecticut Company, New Haven, Conn., has announced that on and after Aug. 2 the fare rate will be three tickets for 25 cents on every line operated by the company in Connecticut. The old rate was three tickets for 25 cents on all lines except those in the Bridgeport district, where the fares were two tickets for 15 cents. The Public Utilities Commission has authorized the change.

Rerouting in Effect.—The Arkansas Central Power Company, Little Rock, Ark., put into service July 15 the new curves recently installed on Capitol Avenue and Main Street for the rerouting of cars recommended by Ross W. Harris, traffic expert, recently employed by the city of Little Rock.

Bus Permit Denied.—The Council of Hornell, N. Y., recently rejected the plea of C. G. Abernathy, who sought a permit to operate buses from Hornell through North Hornell to Arkport. His principal object was to provide bus service for North Hornell, where the Hornell Traction Company recently discontinued its lines.

New Parking Laws Passed. — The Council of Rochester, N. Y., has passed a new traffic code, including drastic limitations of parking in the downtown districts, provision for arterial highways and addition of many one-way streets. With the opening of Aldridge Concourse, the new street over the interurban and rapid transit subway on Aug. 1, relief from Main Street traffic congestion is expected.

Wants to Substitute Bus Service.—The Pacific Electric Railway, Los Angeles, Cal., has asked the Railroad Commission for permission to abandon service and to remove its tracks on four avenues and five streets in the city of Redlands. The reason for this abandonment is that the city proposes extensive improvements on those streets and the company is unable to stand the expense of its share of the work. It is proposed to substitute bus service for the discontinued railway service.

Railways Spurn Steam Line.—The Michigan Public Utilities Commission has advised the Interstate Commerce Commission that the electric railway properties have shown no desire to acquire the Kalamazoo, Lake Shore & Chicago Railway, Kalamazoo, Mich., a steam property, which will be abandoned following an order of the Interstate Commerce Commission. The line extends from Kalamazoo to Lawton, Mich., a distance of approximately 16 miles. The State Utilities Commission thought that electric railway managements might be interested in securing this line in order to tie it in with other electric railway transportation in the State.

Compromise Extends Fare Zones.—Extensions of fare zones on the Hartford Avenue, Manton Avenue and Plainfield Street lines of the United Electric Railways, Providence, R. I., will become effective at once as a result of a compromise reached between the city and the traction company at a hearing before the Public Utilities Commission on July 21 on protests against recent fare increases and zone changes. The announcement was made by City Solicitor Elmer S. Chaces, who appeared on behalf of the city, the company having waived the thirty-day clause relating to new tariff schedules. As a result of several recommendations for improvement in service the hearing was adjourned to Aug. 5 to permit the officials of the company to make answer. Lengthening of zones, reduction of second zone fares and the issuing of commutation tickets were some of the items brought out at the hearing.

Honor Fare System Pronounced Success.—Clinton D. Smith, general manager of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway, New Brighton, Pa., has firm faith in the honor fare system which went into effect about two months ago. The result has been that the patrons of these two lines are considered 99½ per cent honest. The system means that the patron boarding the car tells the motorman his destination and drops into the fare box 5 cents for each zone through which he passes. If a transfer is necessary this is given to the passenger. Before the institution of the honor system identification slips were issued to passengers.

Readjustment Application Dismissed.—The application of the Key System Transit Company, Oakland, Cal., for readjustment of passenger fares between points in Alameda County and Contra Costa County has been dismissed by the commission.

Uniforms Reduced in Price.—The Los Angeles Railway, Los Angeles, Cal., announces that it will be able to reduce the price of uniforms from $28 to $27. The price of the ventilated caps will also be reduced from $2 to $1.85. This reduction is the result of careful buying and the signing of a new contract with the men. Uniforms on hand were purchased by the company under the old contract, but will be sold to trainmen at the new price of $27.

Funeral Pyre of Railway Equipment.—Several trailers and one old car of the Brunswick & Interurban Railway, Brunswick, Ga., were burned recently as a first move in the junking of the property. The road has been on the verge of suspension for many months. At a recent election residents of the city voted against taking over the line.

Buses to Cease Operating.—Buses operated in connection with the Greenfield & Turners Falls Street Railway, Greenfield, Mass., were set to be discontinued on Aug. 1, when the line passes from the Connecticut Valley Street Railway to the Greenfield & Montague Transportation Area, trustees of the new municipal control have announced. At the same time the service will be put on a half-hour instead of an hourly basis. For some time the buses, operated over a shorter route, have alternated with the trolley cars.

Fare Evidence Concluded.—Evidence was closed on July 23 in the application of the Poughkeepsie & Wappingers Falls Railway to the Public Service Commission for permission to increase fares in its operating zones to 10 cents. The company submitted certain information as to additions and retirements of property requested at the last hearing by the counsel for the commission and the city of Poughkeepsie, and cross-examination on these exhibits was completed. At the adjourned hearing in the afternoon accountants and engineers of the commission testified as to examinations of the books and properties of the company.

Use of One-Man Cars Being Extended.—Under new plans formulated by the Rochester lines of the New York State Railways, one-man cars will be used more extensively on "owl" runs and on Sundays on lines where traffic is lightest. These are phases of a general plan, fostered by James F. Hamilton, president of the company, and Charles R. Barnes, city commissioner of railways, for effecting economy in operating costs on trolley lines where travel is light to provide additional funds for the maximum of service on heavy travel lines. Two lines now are operating one-man cars exclusively, and this service may be extended to other lines for all day travel.

Files New Rate in Springfield.—The Springfield Street Railway has filed with the Massachusetts State Public Utilities Commission a petition for an increase of the cash fare from 7 cents to 10 cents, with three tickets for 25 cents and school pupils' tickets at 5 cents. Nine zones are provided for in the Springfield division, five in the Westfield division and seventeen in the Palmer, Monson, Ware, Three Rivers and Bondsville divisions. Special coupon tickets good between points in different zones, especially for the accommodation of industrial workers, are provided in certain cases at a rate of eight for $1, and in other instances twelve for $1. Subject to certain exceptions, cash fares and tickets entitle passengers to transfers.

Railway Opposes Bus Application.—The Philadelphia Rapid Transit Company, Philadelphia, Pa., opposes the application of Wilbur F. Menke to operate sightseeing buses because it is about to establish lines of buses on a route that would parallel that outlined by the applicant. Mr. Menke desires to run buses from the Arcade Cafe, at Broad and Juniper Streets, to Fairmount Park and thence to Evergreen Farms, at the upper end of Roosevelt Boulevard, operating on a schedule at a fare of $1 for the round trip. He would not take any passengers en route.

Stop Signals Proposed. — Believing that stop signals on the rear of electric cars would avert many accidents, directors of the Cincinnati, Ohio, Automobile Club have suggested to the city solicitor that a provision be inserted in the new traction ordinance requiring the Cincinnati Traction Company to install such signals. According to the club officials, many letters have been received from their members advocating the use of stop signals as a means of preventing collisions between street cars and automobiles. In their letter to the city solicitor they point out that an ordinance as they propose is in effect now in Cleveland and Detroit and that stop signals also are carried by some street cars in Dayton, Ohio.

Financial and Corporate

Security Holders Approve

Plans for the Reorganization of the New York Railways Accepted by Bondholders

Announcement was made on July 28 that a plan and agreement dated July 18 had been adopted by the committee representing New York Railways first real estate and refunding bonds. At the same time, John Candler Cobb, chairman of the protective committee for the New York Railways 5 per cent adjustment bonds, issued a statement in which the opinion was expressed that the new plan appeared to be "unnecessarily complicated," but urging all security holders to accept the plan "and let the company get down to business."

The plan has been authorized by the Transit Commission and has been approved by Judge Julius M. Mayer of the Federal Court. Dissension among certain bondholders had threatened to prevent the carrying out of the plan, which, however, has been approved and adopted by the protective committees representing the following securities: New York Railways thirty-year first real estate and refunding mortgage 4 per cent gold bonds, New York Railways adjustment mortgage thirty-year 5 per cent income bonds, Lexington Avenue & Pavonia Ferry first mortgage 5 per cent gold bonds and Lexington Avenue Railroad stock.

The committee which announced its adoption of the plan is composed of Harry Bronner, Haley Fiske, Caspar W. Morris, Harold Palagano, Charles A. Peabody, Harold Standley and Willis D. Wood.

The statement by Mr. Cobb, chairman of the protective committee for the 5 per cent adjustment bonds of the New York Railways, says in part:

> The New York Railways plan of reorganization seems to me in certain respects rather unnecessarily complicated and the reason for some of the minor details is not clear, but I fully appreciate the difficult and complicated situation the reorganization committee has had to deal with.
>
> Very curiously the fact that there are no outstanding receivers' certificates, but, on the contrary, a large amount of cash and property not needed for the reorganized company, seems to have increased the difficulties of reorganization instead of simplifying them.
>
> Another difficulty which must have hampered the committee is the very drastic, and I believe entirely unwarranted, cut in total capitalization. This cut bears especially heavily on our 5 per cent adjustment mortgage bonds, as we stand the bulk of it. This situation is, however, considerably ameliorated by the fact that, although the new securities to be received by the adjustment bonds show a very drastic cut in principal, the provision for income gives us 70 per cent of what we were entitled to under our old bonds and our prospect of getting it is increased by a material reduction in charges ahead of us.
>
> The fact that the reorganization is effected without any assessment or charge to the many thousands of holders of securities is important, as such assessments are a serious problem to many who have not the facilities to take care of themselves and usually bear with especial severity on the small holder.
>
> When the reorganization is completed and the financial readjustments made the company should, on the basis of present conditions, be able to earn, with active and progressive management, all charges ahead of the preferred stock, including the income bond interest.
>
> On the whole it is of such vital importance to us all to get the company out of the hands of receivers and lawyers and on a sound and independent operating basis that it is clearly for the interest of all the security holders to promptly and unitedly accept the plan and let the new company get down to business.

Northwestern Ohio Property Passes to Doherty

The property of the Northwestern Ohio Railway & Power Company has come under control of the Henry L. Doherty & Company interests through a recent purchase from the General Gas & Electric Corporation headed by W. S. Barstow. Along with railway, which sells power to a dozen small municipalities, was included the property of the Sandusky Gas & Electric Company, which will be transferred to the Ohio Public Service Company.

As in the case of several similar acquisitions lately made by the Doherty interests, the power properties will probably be separated from the traction lines and operated independently.

The property of the Northwestern Ohio Railway & Power Company was carried at $2,641,348, according to the latest balance sheet available. The company operates 52 miles of track between Toledo and Marblehead and has 22 miles of high tension lines tied in with the Toledo Edison lines for supply from the Acme station at Toledo.

There is a first mortgage bond issue of $1,293,000 due July 1, 1932, preferred stock amounting to $500,000, and common stock of a par value of $800,000, all owned by the former holding company.

Short Long Island Lines Unprofitable

Among the properties operated by the Long Island Railroad there are included four short electric railway lines operated to the shore from the main line of the railroad. These properties are the Ocean Electric Railway, Far Rockaway, 15 miles; Northport Traction Company, 2.69 miles; Nassau County Railway, 1.55 miles; Glen Cove Railway, 3.25 miles. All the roads except the Ocean Electric Railway were operated at a deficit in 1923. The earnings of the companies are contained in the accompanying statement.

$359,026 Deficit by Interborough for Year

There was a deficit of $359,026 upon the Interborough Rapid Transit Company system in New York for the fiscal year ended June 30, 1924, and a deficit of $412,621 for the month of June, 1924. The corresponding statement last month showed a balance of net income of $53,595 for the eleven months ended May 31, 1924, and a balance of $42 for the month of May, 1924.

The company explains that the deficit for June and the deficit for the fiscal year were caused principally by the deduction from June revenues of $310,000 for income tax from Jan. 1, 1924, to June 30, 1924, imposed by the new income tax law of May, 1924, and by the deduction of $233,877 as a reserve to cover contingent liability since July 1, 1922, to stockholders of the Manhattan Railway, who have not yet formally assented to the readjustment plan.

There have been decisions both ways on the question of this liability and the cases are on appeal, but, pending final adjudication, the board of directors decided unanimously, in view of the adverse decisions, to create such a reserve. It will amount to about $5,500 monthly hereafter. There was also deducted from June, 1924, revenues the balance of 15 cents a share, amounting to $90,000, which had not been accrued on account of Manhattan rental for the year ended June 30, 1923. This balance was subsequently found to be due and was paid on July 1, 1924. These reserves were not accrued monthly because it was believed until recently that the liability involved was too remote to require such a course. It became necessary therefore to make the readjustment when decided upon at the close of the fiscal year by the method which has been described.

Sale Terms Being Negotiated at Milwaukee

The principal provisions of the proposed contract between the city of Milwaukee and the Milwaukee Electric Railway & Light Company, aimed to provide eventual municipal ownership, have been summarized as follows:

> Contract to go into effect Jan. 1, 1925, after having been approved by the people at the November election and by the Wisconsin Railroad Commission.
>
> Contract to run in successive periods of ten years with an option by the city to purchase by giving six months written notice.
>
> Fare to remain the same—7 cents cash or freight tickets for 50 cents—until "stabilizing reserve" fund shall be effected.
>
> Company for first year given a return of 7.7 per cent on its investment, excess to go to the city.
>
> City to pile up an interest in the company through the so-called "city equity account," built up by loans to the company; through excess earnings which accrue to the city and through taking "municipal

INCOME STATEMENTS OF ELECTRIC RAILWAYS OWNED OR CONTROLLED BY THE LONG ISLAND RAILROAD

	Operating Revenues	Operating Expenses, Including Taxes	Operating Income	Other Income	Gross Income	Deductions from Gross Income	Net Income
Ocean Electric Railway	$335,803	$215,167	$120,635	$2,592	$123,228	$74,443	$48,785
Northport Traction Company	14,842	15,681	Def. 838	212	Def. 626	586	Def. 1,212
Nassau County Railway	19,676	23,567	Def. 3,890	212	Def. 3,678	38	Def. 3,716
Glen Cove Railroad	31,136	36,764	Def. 5,628	212	Def. 5,415	146	Def. 5,561

> mortgage bonds" on the company property.
>
> City to have control over service and over extensions of service during the period of the contract, with certain restrictions.
>
> Option to purchase to include the company's heating, lighting and railway property in the entire metropolitan district, including Milwaukee, Cudahy, North Milwaukee, South Milwaukee, Wauwatosa, West Allis and villages of Shorewood, West Milwaukee and Whitefish Bay and intervening territory.
>
> City utility commissioner provided for, whose salary is paid by the company.

The important matter of the valuation has also been touched upon recently in the comment in the daily papers. The figure most frequently mentioned in this connection places the amount at $50,000,000.

Fred S. Hunt, chairman of the street railway acquisition committee, made a statement in which he said:

> The presumption is that the proposed contract has not as yet been submitted to the company's highest officials, some of whom are away on vacation. We have agreed on many of the points involved in the contract but there are still a few which remain to be cleared up.

It is expected that the proposed contract will be submitted to the voters at the fall election if an agreement is reached. The contract would first have to go to the Common Council.

Buses Must Be Substituted.—Permission has been granted by the Railroad Commission to the Pacific Electric Railway to discontinue railway service on East Washington Street from Lake Avenue, Pasadena, to the end of the line at Tierra Alta in the County of Los Angeles, on condition that motor bus service be installed.

Stretch of Line Discontinued.—The Hartford & Springfield Street Railway Warehouse Point, Conn., planned to discontinue service to Somers, Conn., on July 27, and to fix the terminus of the Somers and Enfield division at McCormick's corner in Somersville. This will be the first section of track to be discontinued on the East Side system of the Hartford & Springfield. The stretch to be discontinued, from McCormick's Corners to Somers Center, is 2.3 miles.

Net Earnings Show Falling Off.—In June the net earnings of the Eastern Massachusetts Street Railway, Boston, Mass., were $32,593 compared with $59,021 during the corresponding month last year. The total revenue and income for the month was $767,575, and the expenses and taxes $618,227. The fixed charges were $112,054, slightly less than during June, 1923.

Loss for Six-Month Period.—The Massachusetts Northeastern Street Railway, Haverhill, Mass., reports to the Department of Public Utilities for the six months ended June 30 a net loss of $17,834, compared with a net loss of $29,153 during the corresponding period a year ago. The number of revenue passengers dwindled from 5,544,454 in the first six months in 1923 to 4,349,543 during the first six months of the present year.

Gross Revenue and Net Income Fall Off.—For the six-month period ended June, 1924, the gross revenues of the Twin City Rapid Transit Company and subsidiaries, Minneapolis, Minn., were $6,635,455, against $7,045,975 for the six-month period of 1923. Operating expenses showed a decrease of only 2.4 per cent and the net income fell off from $929,075 for the first six-month period in 1923 to $604,189 for the period from January to June, 1924.

Fewer Passengers Carried.—For the six-month period ended June 30, 1924, the net income of the Capital Traction Company, Washington, D. C., amounted to $466,200, compared with $583,446 for the corresponding period a year ago. The decrease in earnings is attributed to the decline in the number of revenue passengers carried. In the first six months of this year the company carried 33,366,020 revenue passengers, while in the similar period last year the number was 35,815,501.

Park Offered for Sale.—Pine Rock Park, purchased by the Connecticut Railway & Lighting Company, New Haven, Conn., to be developed into an amusement park, has been offered for sale. The land, which is a natural beauty spot consisting of about 150 acres, is situated on the company's line which runs from Bridgeport, Conn., to Derby. The Connecticut Railway & Lighting Company is operated under lease by the Connecticut Company.

Wants Properties Turned Over.—The Los Angeles Railway Corporation, City Railway Company of Los Angeles, and the Los Angeles Railway have filed a joint application with the Railroad Commission for authority for the two former corporations to turn over to the Los Angeles Railway all lines and properties now held separately by the three corporations. The Los Angeles Railway also asks authority to issue its bonds in the aggregate amount of $30,939,000 and for authority to issue such amount of its common capital stock as the commission considers fair and reasonable, and to exchange the same with the stockholders of Los Angeles Railway Corporation and City Railway of Los Angeles for their holdings of stock in those corporations.

$20,000,000 Public Service Issue Offered.—A $20,000,000 issue of 6 per cent bonds for the Public Service Corporation of New Jersey is offered by Drexel & Company, Philadelphia, and Bonbright & Co., Inc., New York. These are secured gold bonds, 6 per cent, series, due 1944, and are priced at 96. They will be a direct obligation of the Public Service Corporation of New Jersey and will be secured by 4,283,334 shares of the common stock of the newly consolidated Public Service Electric & Gas Company, which is a subsidiary of the corporation. Additional bonds in other series under the indenture may be issued to an amount not exceeding $10,700,000 against the pledge of the remaining 2,141,666 shares of common stock of the company, also held by the parent corporation, and also to an amount not exceeding 50 per cent of the cash that may be realized by the Public Service Electric & Gas Company from additional common stock hereafter issued and pledged. These bonds will be followed by $21,508,600 of 8 per cent cumulative preferred stock, $9,967,900 of 7 per cent cumulative preferred stock and 699,185 shares of common stock, representing at present market quotations an equity in excess of $70,000,000.

Line Brings $36,950.—Operations were suspended by the Caldwell Traction Company, Caldwell, Idaho, on June 10. Recently bondholders of the company bid the property in at a sheriff's sale at a total figure of $36,950. The line is 11 miles long. Of the amount bid $1,950 was in cash and $35,000 in bonds. The sale was made on order of the District Court after a judgment of $143,000 had been obtained against the railroad property, which was pledged as security for a bond issue of $100,000. C. D. Purkhiser, former manager of the company, remains in charge temporarily, representing the new owners.

Plan of Adjustment Declared Operative.—A letter has been sent to holders of the Michigan Railroad first mortgage five-year gold bonds, Series A, 6 per cent, due May 1, 1924, by the president, B. C. Cobb, notifying them that a plan of adjustment of the maturing bonded indebtedness has been declared operative by the directors with respect to the bonds deposited. More than 76 per cent in principal amount of the bonds have been deposited. Holders who have not deposited their bonds had until Aug. 1 to do so. The president states the company will make application at once to the Michigan Public Utilities Commission for the necessary approval of the plan and of the issuance of the securities provided under its terms. The National City Bank, New York, is the depository.

Court Proceedings on Valuation Dropped.—Under stipulations filed by counsel for both the United Railways and the city of St. Louis, Mo., court proceedings have been dropped which were pending in Jefferson City and St. Louis for review of the order of the Missouri Public Service Commission fixing the valuation of the street railways at $51,761,384. The dropping of the court proceedings resisting the valuation is expected to assist the work of the reorganization committee of the United Railways. After the commission fixed the valuation the city filed a petition for a writ of review with the Cole County Circuit Court contending the amount was too high. Attorneys for the company then brought similar action in the Circuit Court at St. Louis claiming the valuation as allowed was too low.

Seek Tax Reduction.—Petitions are being circulated in Phoenix, Ariz., asking the State Tax Commission to reduce the valuation of the Phoenix Railway for state and county tax purposes to a figure not to exceed the cash offer of $165,000 made by the city of Phoenix. The revenue in 1923 was $158,938 and in 1924 it is estimated at approximately $145,000. The loss of revenue is attributed to automobile competition.

Two New Directors Chosen.—At the recent annual meeting of the Terre Haute Traction & Light Company, Terre Haute, Ind., two new directors were chosen. They are Wilson Naylor Cox and G. O. Nicolai. Mr. Nicolai succeeded E. M. Walker as general manager of the company when Mr. Walker resigned to go to Schenectady.

Legal Notes

FEDERAL COURT—*Value of Right to Operate Cars.*

The right to operate the only street car system in a city of 250,000 people and to be exempt from taxation for doing so *held* reasonably worth $5,000 a month, in view of an agreement of the parties fixing the value at that amount. [City and County of Denver vs. Stenger, 295 Federal Rep., 809.]

MASSACHUSETTS—*Injury to Driver of Wagon, Striking a Street Railway Pole Maintained Under License, Held Not Actionable.*

Where a street railway erected and maintained a pole in the highway under a license lawfully granted, it is not liable for injuries received by the driver of a wagon who ran into it, even if without such license a pole would be a nuisance. [Curran vs. Boston Elevated Railway, 143 Northeast Rep., 821.]

MASSACHUSETTS — *Contributory Negligence Not Excused Because Person Was Put in Position of Certain Peril.*

A person negligently crossed in front of one car, expecting to take a car in the other direction, but the second car reduced its speed unexpectedly and he was unable to get out of the way of the first car. The court held that it was no answer to a charge of contributory negligence that the intending passenger was unexpectedly put in a position of greater peril than that in which he expected to be placed. [Fitzpatrick vs. Boston Elevated Ry., 144 Northeast Rep., 75.]

MASSACHUSETTS — *Investigator Held Without Authority to Make Settlement for Passenger's Injuries.*

An investigator and adjuster for a claim department was alleged to have lead a claimant to believe that the railway company would settle with her for a larger amount than the company was willing to pay. No evidence was presented in court to show that this claim investigator had any authority to settle claims against the company so the court did not pursue the matter further, declaring the company was not responsible for any such offer. It added that any one dealing with an agent is bound to ascertain the nature and extent of his authority. [Ferrin vs. Boston Elevated Railway, 143 Northeast Rep., 823.]

NEW JERSEY—*Action on Detached Coupon Within Six-Year Limitation.*

An interest coupon, detached from a corporate mortgage bond and providing that a company will pay to the bearer a named sum on a certain date, is a simple contract obligation to pay, and to it the statutory limitation of six years applies. [Dickerson vs. Wilkes Barre & Hazelton Railroad, 124 Atlantic Rep., 512.]

NEW YORK — *Extent of Lessee's Liability for Expense of Eliminating Grade Crossing Determined.*

The International Railway leased a certain section of the tracks of the Erie Railroad, under an agreement which provided, among other things, a certain division of the expenses incurred when overhead crossings were substituted for highway crossings on grade upon the leased section. A change from a grade crossing to an overhead crossing was ordered at Main Street where the tracks of the International Railways left the leased line and turned at right angles to run on the street. The plaintiff claimed that the defendant was liable to share in the cost of constructing this overhead crossing to the extent of paying for all of the work on the leased section and one-half of all other expenditures except the expense of carrying the track on the structure over the street. The defendant denied it had any obligation other than the small item of grading the leased section to bring its track into Main Street. The court held that the International Railway would not gain any benefit from the overhead crossing other than that which was gained by other users of Main Street and that it was not liable to share in the total expense of the work, though it did require it to pay a small additional sum for a cement walk and driveway in connection with the grade crossing which it used in common with the Erie Railroad. (204 New York Sup., Erie Railroad vs. International Railway, 771.)

OHIO—*Employment Begins When Employee Enters Employer's Conveyance to Go to Work.*

Where an employer contracts to carry an employee to and from his work, the employment begins when the employee enters the conveyance to go to the place of work. Hence, an employee of a street railway who was injured at the car stop where he left the street car to go to the carhouse is injured in the course of his employment and his case comes under the workmen's compensation act. [De Camp vs. Youngstown Municipal Railway, 144 Northeast Rep., 128.]

PENNSYLVANIA—*Agreement as to Paving and Repair of Paving Must Be Carried Out, Though Cost Involved Is Greater Than Anticipated.*

The Borough of Swarthmore granted a franchise to a street railway company now represented by the Philadelphia Rapid Transit Company under certain conditions, one of which was that the street occupied should be "telforded or macadamized to a depth of 12 in." from curb to curb and at all times kept in good order. Nether Providence township also granted a franchise to a predecessor of the same railway company, permitting occupation of a certain road on condition that it should be kept "in good order, repair and travelable condition." In the Swarthmore case the company got a ruling from the Public Service Commission that it need maintain only that portion of the highway occupied by its rails and ties, but this was reversed by the court. The company then claimed that as the kind of pavement specified, while satisfactory for the kind of traffic used when the agreement was made, was recognized as entirely unsatisfactory for modern conditions, and as it had not ever agreed to lay a more expensive pavement, it could not be forced to do so. The court held, however, that the existence of a franchise requires compliance with all of its terms, though the carrying out of the contract may eventually result in a serious financial loss to the grantee of the right. While the condition existing at the time that a contract was made must be considered, a specific agreement to do a certain thing must be carried out. It could not be required to install a more expensive pavement than telford or macadam but it could be required to keep that pavement in good condition and the fact that it wore out rapidly was no excuse to prevent performance. In the Nether Providence case, the situation was somewhat different, because the type of paving was not specified. Here the court said that where the duty of the grantee is limited to keeping paving in repair, it must keep that paving in a reasonably passable condition, and changes in the kind of traffic using the road do not excuse the company from carrying out the obligations specified. [Borough of Swarthmore vs. Philadelphia Rapid Transit Co. and Nether Providence Township vs. Philadelphia Rapid Transit Co., 124 Atlantic Rep., 343, 345.]

TEXAS—*Risk of Substation Attendants. Life Insurance Held by Deceased Immaterial in Assessing Damages.*

A substation attendant, while sweeping behind a passageway, was killed by a high tension wire carried close to the point he was required to sweep. The court held that while an employee assumes the ordinary risks incident to his employment, he does not assume risks resulting from the negligence of his employers, even though they are known to him. The criterion was whether an ordinarily prudent man, in the opinion of the jury, would have undertaken to sweep the station at that point. The fact that the employee carried government life insurance should not be considered as a reason for reducing the damages. [El Paso Electric Railway vs. Buttrey, 260 Southwest Rep., 897.]

WEST VIRGINIA—*Injury From Overhang of Car.*

A street railway company operating cars over the streets of a city is required to sound a gong or otherwise give notice to persons traveling thereon at street crossings; it is also the duty of persons at such places of danger to use their own senses, and if a motorman in rounding a curve has kept a proper lookout and has safely passed one using the street at such point he may assume that such traveler will keep out of the way of the overhang of the car in rounding the curve, and he is not bound to stop the car or give further warning of the danger. [French vs. Princeton Power Co., 122 Southeast Rep., 171]

Personal Items

M. J. Insull Heads Middle West Company

Well-Known Operator Succeeds His Brother, Who Becomes Chairman of the Board

Martin J. Insull has been elected president of the Middle West Utilities Company, Chicago, in recognition of his invaluable work as vice-president of the company since its inception in 1912 and of the ability displayed by him in the management of that vast and constantly growing institution. Several months ago changes were made in the company's by-laws creating the position of chairman of the board. Samuel Insull has been elected to that office and will continue to take an active part in the company's management.

M. J. Insull

The great development of the company's business has necessitated an increase in its executive staff. To meet this situation, four additional vice-presidents have been elected, all of whom have been associated with the company in important capacities for a number of years. These new officers are: E. V. Graham, who will be in charge of the sale of securities; W. C. Sharp, who will be in charge of operations; George W. Hamilton, who will be concerned with the hydraulic and electrical engineering end of the company's business, and A. J. Authenreith, who will have the artificial ice engineering under his control. John F. Gilchrist, who has been a vice-president of the company, will continue in that capacity. Samuel Insull, Jr., recently was elected a director of that company.

As stated previously Martin J. Insull has been vice-president, as well as a director and a member of the executive committee of the company, since its organization in 1912. He is also an executive and director of several other important utility companies under the management of Samuel Insull and associates. He is a public utility administrator with both business and engineering training. After he came from England, Mr. Insull was first employed in the Edison works at Schenectady. He was graduated from Cornell University in mechanical engineering in 1893 and was engaged in various electrical engineering, manufacturing and merchandising pursuits in Chicago, New York and Pittsfield, Mass., until 1906, when he took charge of a group of public utility properties in and near New Albany, in southern Indiana, controlled by Samuel Insull, his brother. These southern Indiana properties became part of the Middle West Utilities Company.

In the period since his association with the company the gross revenues of its operating subsidiaries have increased from $3,660,676 in 1912 to $36,185,181 in 1923. The subsidiaries serve directly or indirectly more than 1,000 cities and towns, and while their principal business is the generation and sale of electricity, they do a very large gas, transportation, water and ice business. The company was one of the first to promote customer ownership and its subsidiaries have more than 60,000 stockholders.

Martin J. Insull has received numerous honors from the electric light and power industry since his association with it. In 1920 and 1921 he served as president of the National Electric Light Association and in 1922 and 1923 was chairman of the public policy committee of that association.

P. P. Crafts, purchasing agent for the Eastern Massachusetts Street Railway, Boston, Mass., for the past four years has resigned his position due to ill health. He has been succeeded by T. H. McGarry, formerly assistant purchasing agent.

E. A. Robert has resigned as president of the Montreal Tramways & Power Company, Montreal, Que. It is said that the new United Securities, Ltd., now has full control of the company and its subsidiaries. The new interests have elected Julian C. Smith president, to succeed Mr. Robert.

Ernest H. Shoemaker has succeeded Miss Florence Snyder as auditor of the Marion & Bluffton Traction Company, Bluffton, Ind. Miss Snyder was appointed to the position of auditor in April, 1923.

Obituary

Michael G. Karline of the New York State Railways, Rochester, N. Y., died at his home in that city on July 23 at the age of seventy-six years. He went to Rochester in 1889 after thirteen years of service with the railways in Buffalo, and in November, 1890, when railway service was started in Rochester, he was the first conductor on the new trolleys.

A. L. Kempster

A. L. Kempster, vice-president and general manager of the New Orleans Public Service, Inc., and an officer of that company and its predecessor, the New Orleans Railway & Light Company, since April, 1920, died in that city on July 28. Mr. Kempster had been sick for nearly two years. Not so long ago it was believed that the turning point had been reached in his illness, but subsequently he suffered a relapse from which he rallied only momentarily.

By virtue of his appointment to the New Orleans company in 1920 Mr. Kempster became the operating head of one of the most important public utilities of the South. The company operates 218 miles of track and at the time of his appointment the property was in the hands of J. D. O'Keefe, receiver, for whom Mr. Kempster, who had previously been in Seattle, directed the system.

After leaving Seattle Mr. Kempster engaged in the conduct of investigations into public utilities for Stone & Webster. The survey of the lines of the Brooklyn Rapid Transit Company and the New York Railways was made largely under his direction. For several months he assisted Frederick P. Royce, then general manager for the receiver of the Brooklyn Rapid Transit Company, and assisted in the appraisal of the Manhattan surface lines.

A. L. Kempster

Mr. Kempster was born in Canfield, Ill., in 1872. Entering the employ of the Seattle Consolidated Railway as a clerk at the age of nineteen, he was subsequently made bookkeeper and auditor. When the Seattle Consolidated Railway was reorganized as the Seattle Traction Company, he became secretary and auditor, continuing in these capacities until the merger of the city's utilities under the name of the Seattle Electric Company. After the merger he was made trainmaster of the system.

In 1902 he was advanced to the position of superintendent of transportation, retaining this title for eight years. He was then appointed superintendent of the railway department. Still later he was again promoted, becoming general manager of the Seattle properties. He served in this capacity until early in 1919, when the system was taken over by the city.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

New Equipment Is in Greater Demand

Inquiries Received by Manufacturers Indicate Much Deferred Maintenance Has Been Caught Up

War-time conditions forced upon the electric railways a program that required them to carry out only such work regarded as absolutely essential. Expansion was of course out of the question. So maintenance began to be deferred. It piled up over the period of years. Starting in 1919, however, the companies began to try to catch up with work deferred. This they appear now largely to have accomplished. In fact, a change is being noted by the manufacturers in the nature of the inquiries received by them.

Thus the demand for new parts, rather than for replacements, has lately come to be an important factor in reorders. In fact, one of the largest electrical manufacturing companies reports a tendency of sales to decrease except for larger units and equipment intended to be used in heavy electric traction work. Moreover, the nature of the buying of the railways has recently undergone a change. This has been due partly to the use of the automobile for various purposes connected with railway operation. Thus a manufacturer of tanks for lubricants says he is doing the largest business of his career and one with the electric railways that is somewhat surprising. Again, a large maker of lubricants reports big sales among the electric railways and unusual requests for the delivery of gasoline in bulk.

However, not all the deferred maintenance has been caught up. Far from it. As the JOURNAL's survey of the work for the year indicated, there is still much to be done, but the fact remains that a tendency is showing itself which indicates more real new work in the future with fewer complete replacements.

ACTIVITY IN HEAVY TRACTION

As indicated before, the manufacturers look ahead hopefully to the signs of increasing activity with respect to heavy electrification work. These are interpreted to mean increasingly large expenditures for equipment all along the line, with most beneficial orders for all kinds of accessories. It would be superfluous to review here the projects along this line that are now under way, but it might be well to state that, perhaps, the latest of these projects to be mentioned is a proposal to electrify the Danbury & Bethel branch of the New Haven Railroad, a work that will involve the application of electricity to a line more than 20 miles long.

$1,750,000 to Be Spent in El Paso

El Paso Electric Railway, El Paso, Tex., is planning an expenditure of $1,750,000 in improvements and betterments to the system. Part of the money may not be spent until next year, but at least the bulk of it will be expended during the present year. The biggest item is $1,030,000 for a new 15,000-kw. turbo-generator, new wells and additions to the plan on South Santa Fé Street. Approximately $27,800 will be needed for track extensions and improvements. About $8,300 is being spent on shops and on the carmen's clubhouse. The purchase of new cars is included in the list of improvements.

General Electric Six Months' Orders Show Decrease

Orders received by the General Electric Company, Schenectady, N. Y., for the six months ended June 30 total $144,707,887. This is a decrease of 12 per cent compared with the corresponding period in 1923, when orders totaled $164,263,755. Orders for April, May and June, 1924, totaled $71,219,984, a decrease of 15 per cent compared with the corresponding three months of 1923.

New Norfolk & Western Locomotives Delivered

The first of the new class L.C.-2 locomotives for the Norfolk & Western Railroad were delivered by the builders a short time ago. These locomotives were built jointly by the American Locomotive Company and the Westinghouse Electric & Manufacturing Company. The new design was described at length in the ELECTRIC RAILWAY JOURNAL for Dec. 30, 1922, page 1012. One of the differences between this design and that of the L.C.-1 class is that the phase converter on the older units are of the induction type, while on the new locomotives the converters are of the synchronous type.

Twenty Miles of Extension in Chicago

The Chicago Surface Lines, Chicago, Ill., has commenced work on its extensions, which will cost $1,000,000, in accordance with the terms of an order recently prepared by the Illinois Commerce Commission. The commission's order is in answer to a petition filed several weeks ago by Corporation Counsel Francis X. Busch and subsequent negotiations on the part of the company with the city officials at which plans for certain extensions were agreed upon.

The money to pay for the extensions is to be taken from the special equipment fund, from which $1,500,000 is also shortly to be taken to pay for the 100 new cars to be constructed for the Surface Lines. Under the order of the commission, the Surface Lines will construct approximately 20 miles of track this year.

ELECTRIC RAILWAY MATERIAL PRICES—JULY 29, 1924

Metals—New York

Copper, electrolytic, cents per lb.	13.125
Lead, cents per lb.	7.55
Nickel, cents per lb.	27.00
Zinc, cents per lb.	6.375
Tin, Straits, cents per lb.	49.25
Aluminum, 98 to 99 per cent, cents per lb.	26.75
Babbitt metal, warehouse, cents per lb.:	
Fair grade	60.00
Commercial	28.00

Bituminous Coal

Smokeless mine run, f.o.b vessel, Hampton Roads	$4.325
Somerset mine run, Boston	2.025
Pittsburgh mine run, Pittsburgh	1.875
Franklin, Ill., screenings, Chicago	1.70
Central, Ill., screenings, Chicago	1.625
Kansas screenings, Kansas City	2.00

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.525
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	3.75
Steel bars, cents per lb.	2.15
Ties, white oak, Chicago, 6 in. x 8 in. x 8½ ft.	$1.70

Hardware—Pittsburgh

Wire nails, base per keg	2.85
Sheet iron (28 gage), cents per lb.	3.40
Sheet iron, galvanised (28 gage), cents per lb.	4.50
Galvanized barbed wire, cents per lb.	3.55
Galvanized wire, ordinary, cents per lb.	2.60

Waste—New York

Waste, wool, cents per lb.	15
Waste, cotton (100 lb. bale), cents per lb.:	
White	12–18
Colored	9–14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$1.03
White lead (100 lb. keg), cents per lb.	11.625
Turpentine (bbl. lots), per gal.	$0.84
Car window glass (single strength), first three brackets, A quality, discount*	84.0%
Car window glass (single strength), first three brackets, B quality, discount*	86.0%
Car window glass (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	15.25
Rubber-covered wire, No. 14, per 1,000 ft.	$6.15
Weatherproof wire base, cents per lb.	17.50

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq.yd.	$3.60
Common, per sq.yd.	2.95
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.48
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	53–54
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f.o.b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.50
Light copper, cents per lb.	8.75
Heavy brass, cents per lb.	6.00
Zinc, old scrap, cents per lb.	4.00
Light brass, cents per lb.	5.25
Lead, cents per lb. (heavy)	6.25
Steel car axles, Chicago, net ton	$17.25
Cast iron car wheels, Chicago, gross ton	16.75
Rails (short), Chicago, gross ton	17.25
Rails (relaying), Chicago, gross ton	26.50
Machine turnings, Chicago, gross ton	8.75

Rolling Stock

Menominee & Mariette Light & Traction Company, Menominee, Mich., has placed an order for six new cars. The detailed specifications follow:

Date order was placed	July 7, 1924
Date of delivery	October, 1924
Builder of car body	St. Louis Car Company
Type of car	One-man safety
Seating capacity	32
Length over all	28 ft. ½ in.
Width over all	8 ft. 1¾ in.
Body	Steel
Interior trim	Birch
Headlining	¼-in. Agasote
Roof	Arch
Air brakes	Westinghouse
Axles	A.S.T.M. spec. carbon steel
Bumpers	5-in., 6½-lb. channels
Car signal system	Consolidated
Control	Westinghouse 6 MMK 63 BR
Curtain fixtures,	Curtain Supply Company, No. 90
Curtain material	Pantasote
Destination signs,	Hunter, on ends and sides
Door operating mechanism	Westinghouse
Fare boxes	Cleveland
Fenders	Type "A" Consolidated
Gears and pinions	Nuttall
Hand brakes	Drop handle
Heater equipment,	12 Consolidated, No. 1522, T truss plank, and 2 vestibule heaters
Headlights	Golden Glow S.M.-95
Journal bearings	3¾ x 6 in.
Lightning arresters	Westinghouse M-P
Motors	Two Westinghouse 508-A
Finish	Patton pyroxylin lacquer enamel
Sanders	St. Louis
Sash fixtures	O. M. Edwards 13-M-D-1
Seats	St. Louis, reversible
Seating material	Rattan, spring cushions
Slack adjuster	Westinghouse
Step treads	3-in. safety
Trolley catchers	Keystone
Trolley base	Westinghouse, No. 13 U.S.
Trucks	St. Louis
Ventilators	8 Peerless, St. Louis
Wheels	Steel, 26-in. diam., 2½-in. tread

Detroit United Railway, Detroit, Mich., has put in service on its Flint division two parlor cars built in its own shops. The specifications follow:

Date of delivery	May 15, 1924
Builder of car body	Detroit United Railway
Type of car	Parlor
Seating capacity	30
Total weight	85,700 lb.
Bolster centers, length	34 ft. 3 in.
Length over all	58 ft. 3½ in.
Truck wheelbase	7 ft.
Width over all	8 ft. 7½ in.
Height, rail to trolley base	12 ft. 11 in.
Body	Semi-steel
Interior trim	Mahogany
Headlining	Steel
Roof	Arch
Air brakes	Westinghouse AMM
Axles	6-in.
Bumpers	Hedley
Car signal system	Detroit United Railway
Car trimmings	Dayton
Center and side bearings	Standard
Control	General Electric, Type M
Couplers	M.C.B. radial
Curtain fixtures	Curtain Supply Co.
Curtain material	Silk pantasote
Door operating mechanism	Hand
Headlights	Luminous
Motors	Westinghouse No. 303
Sash fixtures	O. M. Edwards
Step treads	Kass
Trolley retrievers	Knutson
Collectors,	Savage combination shoe and wheel
Trucks	C.-80 P Standard
Ventilators	Detroit United Railway
Wheels	Rolled steel, 36-in.

The Trenton & Mercer County Traction Corporation, Trenton, N. J., will place an order for twenty new double-truck cars, after the Board of Public Utility Commissioners approves of the order and the city of Trenton decides on the color scheme of the cars. Ten of the cars will be for city service and ten for the suburban division. Each will have a seating capacity of 48 and will be arranged for one and two-man operation. Each will contain four-motor equipments.

Key System Transit Company, Oakland, Cal., has ordered five buses from the Fageol Company for use on three routes which it is to establish in the city of Oakland.

Canadian National Railways plans to install storage battery car service between Kitchener and Elmira, Ont. W. D. Euler, member of Parliament for North Waterloo, states that negotiations with the Canadian National Railways have proved fruitful, and the purchasing department of the railway has been instructed to advertise for tenders for the new car.

York Railways, York, Pa., is purchasing three double-truck interurban cars, weighing 32,000 lb. and seating fifty-two. The company is also buying two double-truck cars, weighing 28,000 lb. and seating forty-four.

Grand Rapids Railway, Grand Rapids, Mich., is receiving bids on the one-man, two-man type of car, thirty of which will be purchased to replace rolling stock lost in the recent fire.

Track and Line

Valley Railways, Lemoyne, Pa., will share in the cost of building a new state highway through Lemoyne and New Cumberland. It will lay 8 ft. of oil-bound macadam and will raise its tracks to a new grade level.

Calumet & South Chicago Railway, Chicago, Ill., has been authorized by the Illinois Commerce Commission to extend its line on Torrence Avenue from 112th to 124th Streets. The extension work is scheduled for completion within sixty days. This extension has been urged by the South Chicago Chamber of Commerce since the completion of the first unit of the new Ford plant in the Calumet district.

Houston Electric Company, Houston, Tex., will spend $200,000 on improvements which include repairing, paving, repaving and construction of sidings.

Power Houses, Shops and Buildings

York Utilities Company, Sanford Me., is expending approximately $100,000 this year in building new terminals at Sanford and in completing a loop of track through Sanford and Springvale. The new terminal facilities include a freight yard, an express office, a carhouse and a repair shop.

Boston Elevated Railway, Boston, Mass., by authority of the Massachusetts Department of Public Utilities, will be permitted to use for garage and other building purposes land which it owns at Forest Hills which under the recent zoning legislation could not be used for such purposes. The premises for which the company seeks exemption from the zoning act were all owned and in use for railway purposes prior to the enactment of the new law. The department approved the company's petition on July 24.

Trade Notes

Morse Engineering Company, St. Louis, Mo., has just been appointed exclusive territorial selling agent for the Ramsey Chain Company, with general offices and works at Albany, N. Y. The Ramsey chain is a silent transmission chain of novel construction.

Conveyors Corporation of America, Chicago, Ill., has appointed the Thermal Efficiency Company, Scarritt Building, Kansas City, Mo., as district representative, handling the sale of American steam jet ash conveyors, American cast iron storage tanks, American air-tight doors and other conveyor specialities in western Missouri and Kansas.

Page & Hill Company, Minneapolis, Minn., has recently purchased the Metropolitan Cedar Company at Spokane, Wash. The Page & Hill Western offices, formerly located at Newport, Wash., are now in the Peyton Building at Spokane, Wash. J. E. Seaman, long connected with the pole industry in the production of Western red cedar poles, has joined the Page & Hill organization as manager of Western operations. His headquarters will be in Spokane.

New Advertising Literature

Thompson Electric Company, Cleveland, Ohio, has issued Catalog B-22, describing the method of reflector cleaning by the Thompson safety lowering switch or disconnecting hanger.

National Carbon Company, Inc., New York, N. Y., has issued its new carbon brush catalog, which is in loose-leaf sheet form, to allow for changing of pages and the insertion of additional ones. The technical side of brush operation is emphasized in this pamphlet to a greater extent than ever before. In addition there are illustrations of types of brushes with descriptions of brushes and explanation on how to order brushes.

Square D Company, Detroit, Mich., has issued a new folder showing the complete system of fused bottom meter service switch installations manufactured by the company. This pocket-size folder contains complete illustrations, descriptions and specifications for small and large residence work, apartment jobs, power work and current transformer installations and is intended as a convenient guide to dealers or contractors in either ordering or installing.

Ohmer Fare Register Company, Dayton, Ohio, has issued a ten-page pamphlet called "The Ohmer Way." In this booklet a few of the more popular types of Ohmer fare registers are illustrated.

M. A. Hofft Company, Indianapolis, Ind., has just issued a new booklet, describing in detail National Furnace arches. The booklet points out the lower maintenance costs, outstanding advantages, ease of installing and replacements, as well as other exclusive features of the National arches.

Vacation days are here now!

BUT there's no vacation from the chance of accidents. Executives, safety officials, supervisors and others may go away, after making most careful provisions for the operation of the road during their absence, but safe equipment is one of their best allies.

Peacock Staffless Brake

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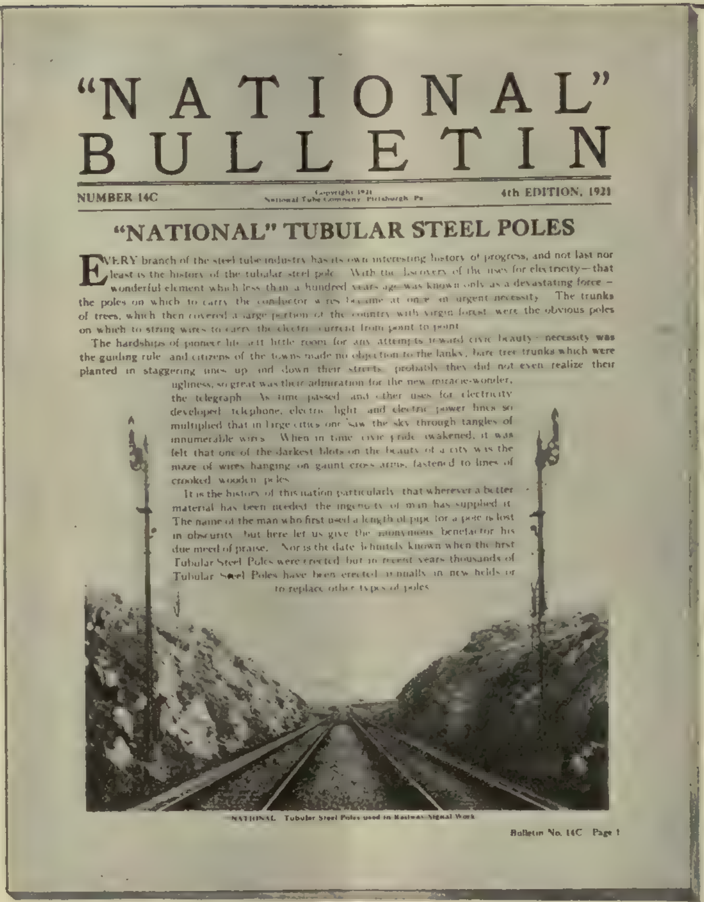

"NATIONAL" BULLETIN

NUMBER 14C Copyright 1921 National Tube Company Pittsburgh Pa 4th EDITION, 1921

"NATIONAL" TUBULAR STEEL POLES

EVERY branch of the steel tube industry has its own interesting history of progress, and not last nor least is the history of the tubular steel pole. With the discovery of the uses for electricity—that wonderful element which less than a hundred years ago was known only as a devastating force—the poles on which to carry the conductor wires became at once an urgent necessity. The trunks of trees, which then covered a large portion of the country with virgin forest, were the obvious poles on which to string wires to carry the electric current from point to point.

The hardships of pioneer life left little room for any attempts toward civic beauty—necessity was the guiding rule—and citizens of the towns made no objection to the lanky, bare tree trunks which were planted in staggering lines up and down their streets; probably they did not even realize their ugliness, so great was their admiration for the new miracle-wonder, the telegraph. As time passed and other uses for electricity developed, telephone, electric light and electric power lines so multiplied that in large cities one saw the sky through tangles of innumerable wires. When in time civic pride awakened, it was felt that one of the darkest blots on the beauty of a city was the maze of wires hanging on gaunt cross arms, fastened to lines of crooked wooden poles.

It is the history of this nation particularly that wherever a better material has been needed the ingenuity of man has supplied it. The name of the man who first used a length of pipe for a pole is lost in obscurity, but here let us give the anonymous benefactor his due meed of praise. Nor is the date definitely known when the first Tubular Steel Poles were erected, but in recent years thousands of Tubular Steel Poles have been erected annually in new fields or to replace other types of poles.

"NATIONAL" Tubular Steel Poles used in Railway Signal Work

Bulletin No. 14C Page 1

Worth While Information on Tubular Steel Poles

CONTENTS OF "NATIONAL" BULLETIN No. 14:

Tubular Steel Poles for (1) Trolley Lines or Tramways (2) Telegraph and Telephone Lines (3) Lighting Poles (4) Transmission Lines; Characteristics and Advantages of "NATIONAL" Tubular Steel Poles; Joints; Tests; Modern practice with regard to Sizes, Lengths, Joints, Repairs, etc., of Poles; Considerations of Installation and Service; Pressures, Stresses and Loads of Poles; Tables giving essential pole details; Tables giving properties of Pipe; Ornaments and Fittings. This Bulletin also contains eighty-three illustrations. A very desirable publication for any executive or engineer interested in line pole installations.

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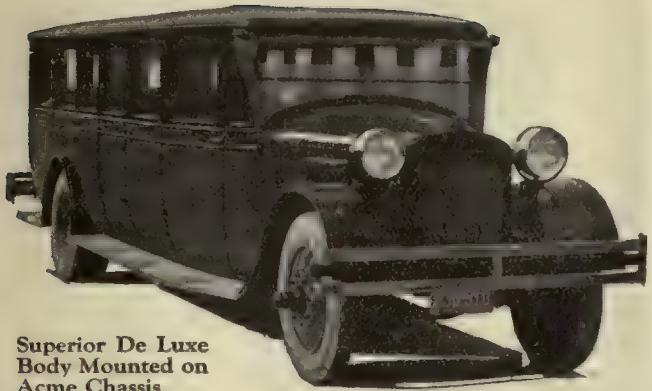

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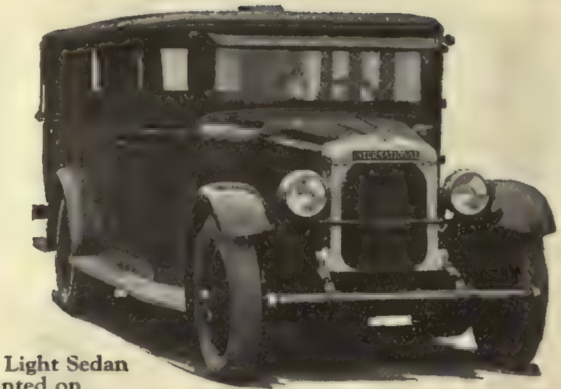
Body Mounted on
Acme Chassis



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International Chassis

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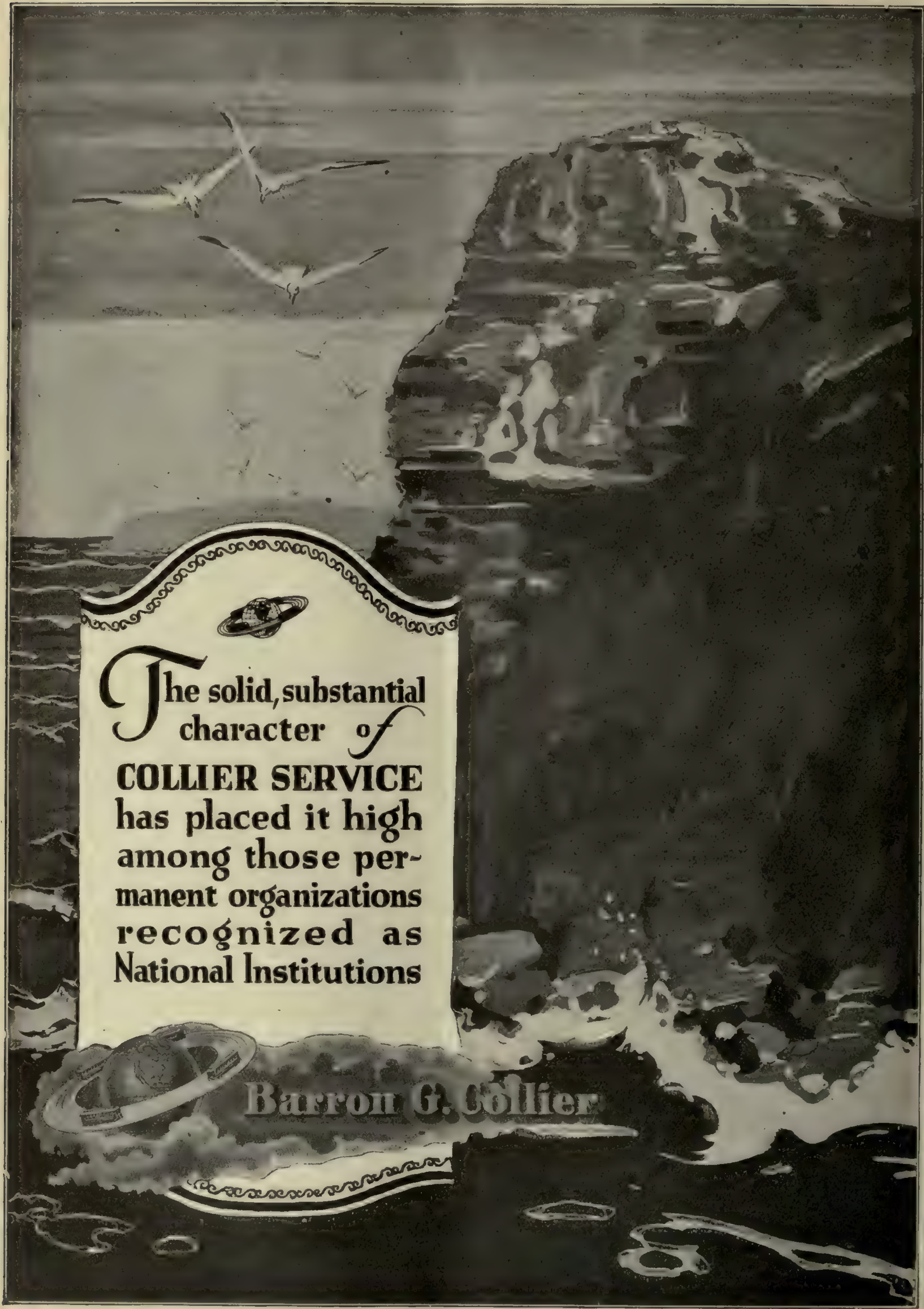

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American Steel Foundries
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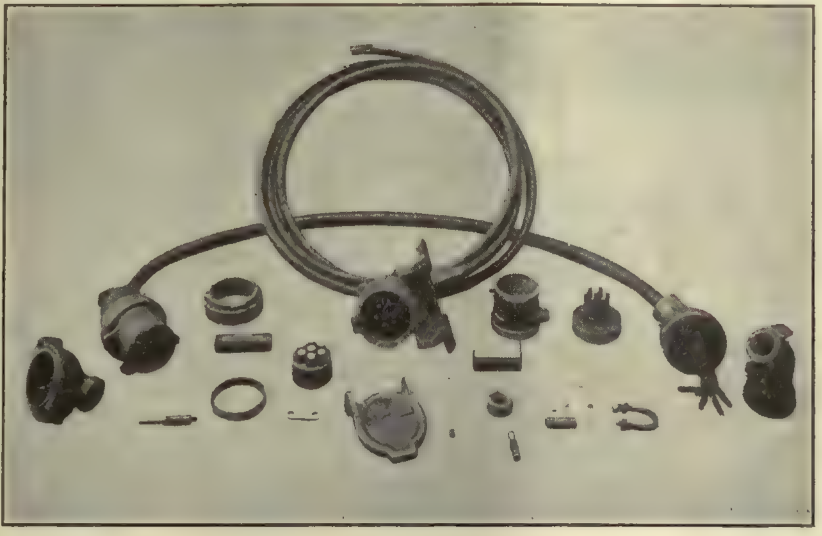
"ONE-WEAR"
STEEL WHEELS



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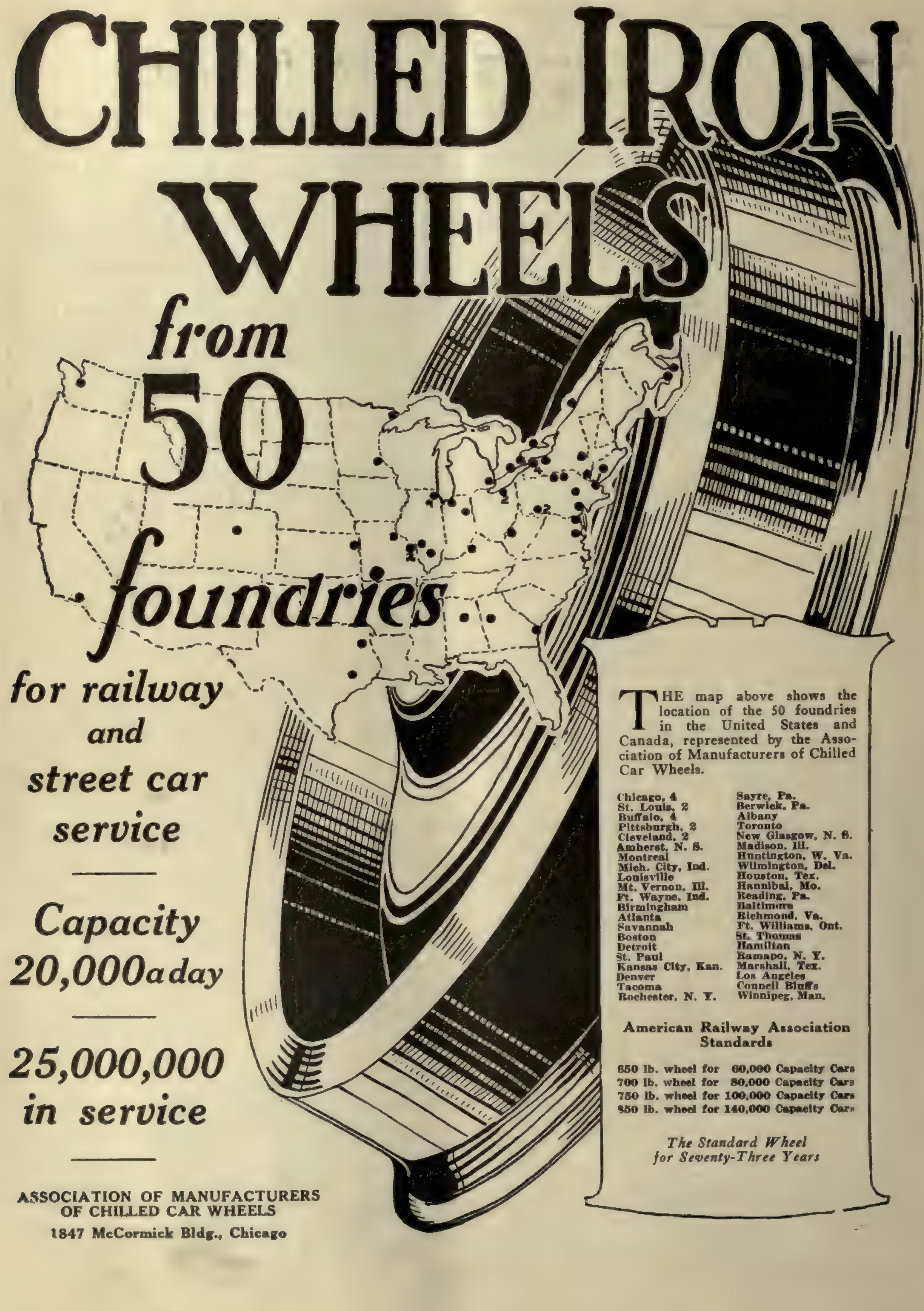

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THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
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Rochester, N. Y.
Sayre, Pa.
Berwick, Pa.
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Toronto
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Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
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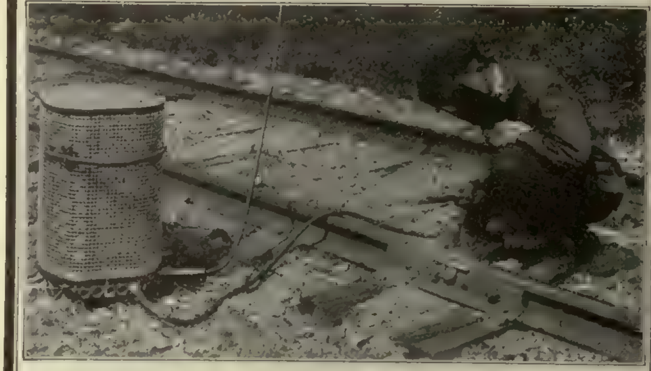

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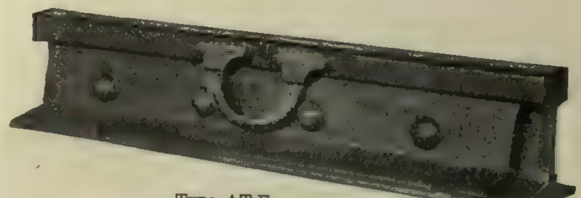

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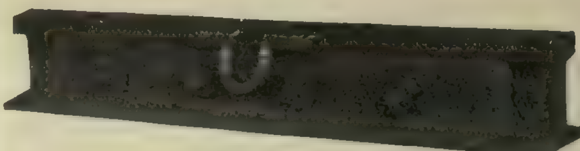

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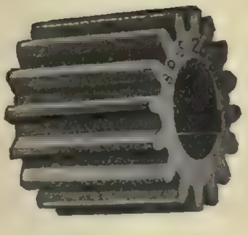

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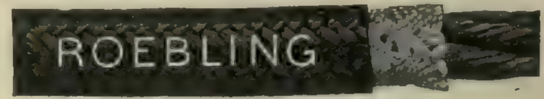

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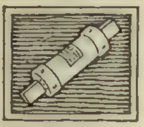
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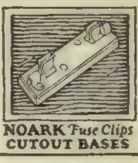
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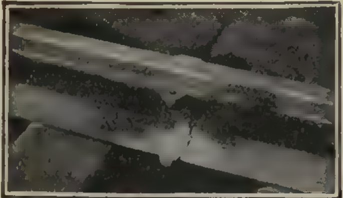

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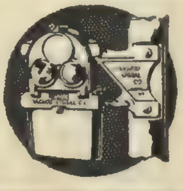

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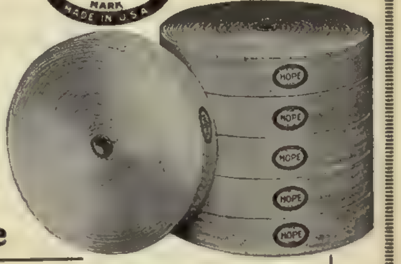

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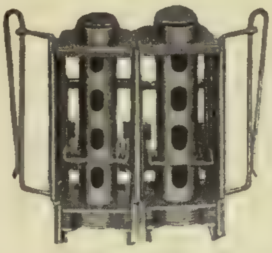


JOHNSON Universal Changer

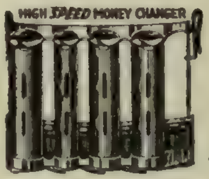
Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.



HIGH SPEED MONEY CHANGERS

1924 model —without rivets— ready for delivery

Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent

"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request.

The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.
HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St.
Chicago, Ill.

Write for Catalogue

1328 Broadway
New York, N. Y.

McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.

Street Cars
Trucks
Snow Sweepers

W.T.B.S. PAT MAY 21.98 SEPT 1.03 AUG 2.04 DEC 29 04 JUNE 15 09

Defective Wheels Corrected While They Run

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

ROLLING STOCK
"that rolls"
USUALLY HAS AXLE BEARINGS
lined with

AJAX BULL BEARING ALLOY

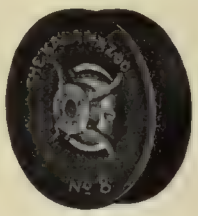
BETTER THAN BABBITT

Wears Longer—Runs Cooler—Costs Less

THE AJAX METAL COMPANY
Established 1880
Main Office and Works: Philadelphia, Pa.
New York Chicago Boston Cleveland

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Tests Prove That Fewer Inspections Are Required

This fact about the Thornton Side Bearing Trolley Wheel is due to the method of lubrication and the extremely long life of the bearings. The construction insures a perfectly balanced wheel and freedom from vibration and noise. Users are getting over 50,000 miles from the side bearings. Write for Bulletin.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky

"Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
Case Hardened Brake Pins	Manganese Transom Plates
Case Hardened Bushings	Manganese Body Bushings
Case Hardened Nuts and Bolts	Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

HASKELITE ROOFS AND HEADLININGS

Ad racks, side linings, truss planks and flooring are being used in 17 new Interurban cars for Illinios Traction Company.

HASKELITE MANUFACTURING CORPORATION
133 W. Washington St., Chicago

PROVIDENCE FENDERS **H-B** LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

For better Axles Specify
"VALSCO"
HEAT TREATED CAR AXLES
LACLEDE STEEL CO.
Arcade Bldg. St. Louis, Mo.

"TAYLOR-MADE" TRUCKS

Have proven their SUPERIORITY for over 30 YEARS, for all types of electric railway cars.
Taylor R. H. Double Truck especially designed for PETER WITT Type Cars.

TAYLOR STRAIGHT ACTION BRAKES

Have made a record for
Safety, Low Maintenance Cost and Successful Brake Operation
In the specifications for your new cars include
"Taylor-Made" Trucks Equipped with Taylor Straight Action Brakes

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.
ESTABLISHED 1892.

V-K
OILLESS TROLLEY WHEEL and NON ARCING HARP
"PERFECT LUBRICATION PLUS MAXIMUM CONDUCTIVITY"
More-Jones Brass & Metal Co
ST. LOUIS MISSOURI

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National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Truck and Car Repair Parts
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co., Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

N-L STOP SIGNAL
Simple in Operation, Installation and Maintenance

Canadian Representative:
Railway & Power Eng. Corp.,
Toronto, Ontario

The Nichols-Lintern Co.
7960 Lorain Ave., Cleveland, Ohio

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS WANTED

EXPERIENCED electrical man, qualified in mechanical and electrical maintaining city and interurban equipment, desires position foreman, master mechanic or armature winder. PW-721, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

GENERAL foreman wishes position; experienced in all city and interurban equipments and shop practice. PW-723, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EMPLOYMENT AGENT

This position requires a man with

1. Mature knowledge of employment.
2. A keen knowledge of human nature.
3. An outstanding personality.

Must be a diplomat, as he will employ skilled workmen for closed shops. We will want successful applicant to be ready for this position about November 1st.

In reply, give a complete account of experience, age, education, references and attach photograph.

P-722, Electric Railway Journal
Leader-News Bldg., Cleveland, Ohio.

Electric Railway Journal
Wants an

ADVERTISING SALESMAN

Transportation—experience and technical training desirable. Sales and advertising experience desirable but not essential. Unusual opportunity for good position which also offers attractive possibilities of advancement. In your application, give full particulars including age, education, experience and present position to David Cameron, Business Manager, 10th Ave. at 36th Street, New York.

WANTED

THREE BIRNEY ONE-MAN CARS

Double End Operation. To Trade on two Double Truck Cars.

BANGOR & NAZARETH TRANSIT CO.,
Bangor, Pa.

A
"Searchlight"
Ad
Costs Little
and is
Quick Acting

0231

For Sale

25 One-Man Safety Cars

The Department of Street Railways, City of Detroit, is offering for sale 25 or any part thereof, single truck, double end Safety Cars, for Standard Gauge Track, equipped with electric heaters, thermostats, headlinings, center lighting, opal shades, air-operated National R-7 registers, air-operated snow scrapers, Hunter signs, steel wheels, Nichols Lintern signals. Approximate weight of cars is 17,000 lbs. The electrical equipment is G. E. 264 or West. 508 Motors. Ohio Brass Company's trolley bases. G. E. CP-27 or West. DH-16 air compressors.

This equipment is approximately two years old and may be inspected by calling at the Department of Street Railways, Detroit, Michigan.

Cars built by the J. G. Brill Car Co., St. Louis Car Co., Osgood-Bradley Car Co., or McGuire-Cummings Mfg. Co. may be selected. Trucks of above cars are the Builder's standards.

Proposals are solicited for all or any part of the above offering, F.O.B. Flat Cars, Detroit, Michigan, and these may be directed to Frank Meyer, Jr., Purchasing Agent, Department of Street Railways, Administration Building, St. Jean and Shoemaker Aves., Detroit, Mich.

These proposals will be opened on **August 21, 1924, at 11:00 A.M.**, at which time consideration will be given to all bids submitted.

Bidders must deposit a certified check in a sum equal to five per cent of the amount of the bid, payable to the City Treasurer, City of Detroit, State of Michigan, with the Department of Street Railways, which will be forfeited upon failure to enter into contract within ten days after notification of award of contract or order agreement.

FOR SALE

A number of second-hand closed and open

Electric Car Bodies, Trucks, Motors, Controller and Stationary Air Compressors

PUBLIC SERVICE RAILWAY CO.

Address inquiries to

GENERAL STOREKEEPER
703 Ferry St., Newark, N. J.

For Sale—Built in 1920

2—Kuhlman Semi-Steel Interurban Cars, Passenger, Smoker and Baggage.

Length 54-ft. 7¼-in.; width 8-ft. 6-in.
Brill 27 MCB 2 Trucks.
4 G. E. 203 motors. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Rails
New-Relaying

See our full page announcement on Page 29.

L.B. FOSTER CO.
PITTSBURGH — NEW YORK CITY

FOR SALE

20 ALL STEEL CARS

Practically New

Length over bumpers	50 ft. 10 in.
Length over corner posts	36 ft. 6 in.
Width over all	8 ft. 7 in.
Height over all	11 ft. 7½ in.

Cars are complete and ready for operation including WH air brakes. Seat 52 people.

TRUCKS

Standard 050 4 ft., 10-in. wheel base.

ELECTRICAL EQUIPMENT

Consists of a 4 WH-514 motors and K35 controllers for double end operation.

Code "Cun"

Transit Equipment Co.
Cars—Motors
501 Fifth Avenue, New York

Generator

1—General Electric Multipolar, No. 661. Type M.P. Class 10-750-100. Full load volts 600. No load volts 500. 1250 amperes 100 r.p.m. No engine shaft or bearings included.

St. Louis Smelting & Refining Wks.
of National Lead Co.,
722 Chestnut St., St. Louis, Mo.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stand
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.

Axles, Bus
Standard Steel Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
More-Jones Brass & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

Benders, Rail
Railway Track-work Co.

Boiler Tubes
Nat'l Tube Co.

Boilers
Babcock & Wilcox Co., The

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric, Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Boxes, Switch
Johns-Pratt Co.

Brackets and Cross Arms (See also Poles, Ties, Posts etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Bulkheads
Haskelite Mfg. Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
International Motor Co.
N. Y. Transportation Co.
St. Louis Car Co.
Superior Motor Coach Body Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables (See Wires and Cables)

Calculating Machines
W. A. Morschhauser

Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.

Cambric Yellow & Black Varnish
Mica Insulataor Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Apparatus
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
More-Jones Brass & Metal Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Change Carriers
Cleveland Fare Box Co.
Galef, J. L.

Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.

Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Reinforcing Bars
Laclede Steel Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Conduits, Underground
Std. Underground Cable Co.

Connectors, Solderless
Westinghouse Elec. & M. Co.

Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.
Rome Wire Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Work
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.

Crossing Foundations
International Steel Tie Co.

Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., Wm.

Crossings, Manganese
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

Crossing Signals .See Signal Systems, Highway Crossing)

Crossings, Track, (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Crushers, Rock
Allis-Chalmers Mfg. Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Morton Mfg. Co.

Cutouts
Johns Pratt Co.

Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.

Derailing Switches, Tee Rail
Ramapo Ajax Corp.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Door Operating Devices
Consolidated Car Heating Co.
National Pneu. Co. Inc.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.
St. Louis Car Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging, (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.

Ears
Ohio Brass Co.

Economizers
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Electric Grinders
Railway Track-work Co.

Electrodes, Carbon
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Railway Track-work Co.

Electrodes, Steel
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Railway Track-work Co.

Electrical Wires and Cables
American Elec. Works
Roeblings Sons Co., J. A.
Rome Wire Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Beeler, John A.
Bibbens, J. Rowland
Buchanan & Layng
Bureau of Commercial Economics, Inc.
Day & Zimmerman, Inc.
Drum & Co., A L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly, Cooke & Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Railway Audit & Inspection Co.
Richey, Albert S.
Dwight P. Robinson & Co.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster

Engineers Inspecting & Chemists
Pittsburgh Testing Laboratory

Engines, Gas, Oil and Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.

Expansion Joints, Track
Wharton, Jr., & Co., Inc., Wm.

Exterior Side Panels
Haskelite Mfg. Co.

Fare Boxes
Cleveland Fare Box Co.
Galef, J. L.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co
Electric Service Sup. Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse Elec. & M. Co.

Field Coils (See Coils)

Flangeway Guards
Godwin Co., Inc., W. S.

Flaxlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Electric Service Sup. Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.

Frogs, Track. (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Funnell Castings
Wharton, Jr., & Co., Inc., Wm.

Furnaces, Electric
American Bridge Co.

Fuses Cartridge, Non Refillable & High Voltage
Johns Pratt Co.

Fuses Cartridge, Refillable
Johns Pratt Co.

Fuses and Fuse Boxes
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Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gaskets
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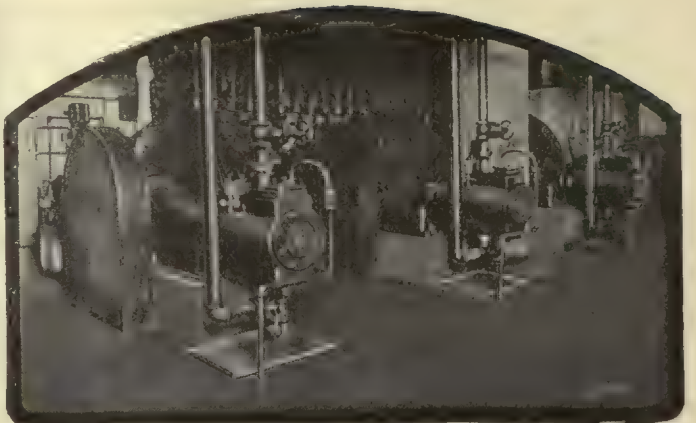

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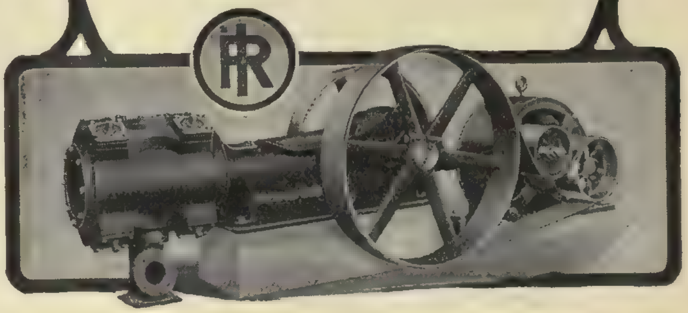

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Ingersoll-Rand
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Gear Blanks
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Carnegie Steel Co.

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Chillingworth Mfg. Co.
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Westinghouse Elec. & M. Co.

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Bethlehem Steel Co.
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General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

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Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co., The

Goggles, Safety
Indianapolis Switch & Frog Co.

Gongs (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grinding Supplies
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Metal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable
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Grinders, Portable Electric
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

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Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

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Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Electric Service Sup. Co.
Smith Heater Co., Peter Wm.

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Power Specialty Co.

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Indianapolis Switch & Frog Co.
Railway Track-work Co.

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Oskel Equipment Co.

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Pittsburgh Testing Laboratory

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General Electric Co.
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General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co

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Amer. Ins. Machinery Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

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Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse Elec. & M. Co.

Insulation Cloth Paper & Tape
Mica Insulator Co.

Insulation, Slot
Irvington Varnish & Ins. Co.

Insulator Pins
Electric Service Sup. Co.
Hubbard & Co.

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Electric Ry. Equipment Co.
Electric Service Sup. Co.
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Ohio Brass Co.
Westinghouse Elec. & M. Co.

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Lapp Insulator Co., Inc.

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Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
National Ry. Appliance Co.
Templeton Kenly & Co.

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Brill Co., The J. G.

Junction Boxes
Standard Underground Cable Co.

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General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Arrestors
Shaw, Henry M.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Line Material (See also Brackets, Insulators, Wires, Etc.)
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Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
English Electric Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Westinghouse Elec. & M. Co.

Locking Spring Boxes
Wharton Jr. & Co., Inc., Wm.

Locomotives, Electric
General Electric Co.
Westinghouse Elec. & M. Co.

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Galena-Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Oil Co.
Texas Co.
Universal Lubricating Co.

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Machine Tools
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Manganese Parts
Bemis Car Truck Co.

Manganese Steel Castings
Wharton Jr. & Co., Inc., Wm.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
Wharton Jr. & Co., Inc., Wm.

Manganese Steel Switches, Frogs and Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp

Meters, Car Watt-Hour
Economy Electric Devices Co.

Mica
Mica Insulator Co.

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General Electric Co.

Motor Buses
(See Buses, Motor)

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Brill Co., The J. G.
Electric Service Sup. Co.
St. Louis Car Co.
Wood Co., Chas. N.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

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Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

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Oil Heaters
Power Specialty Co.

Packing
Electric Service Sup. Co.
Westinghouse Tr. Br Co.

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Baldwin Locomotive Wks.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Pavement Breakers
Ingersoll-Rand Co.

Paving Guards, Steel
Godwin Co., Inc., W. S.

Paving Material
Amer. Br. Shoe & Fdry. Co.

Pickups, Trolley Wire
Electric Service Sup. Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Pipe
National Tube Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Electric Service Sup. Co.

Pneumatic Tools and Accessories
Ingersoll-Rand Co.

Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.

Pole Reinforcing
Drew Elec. & Mfg. Co.
Hubbard & Co.

Poles and Ties, Treated
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International Creosoting & Construction Co.
National Pole Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.

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International Creosoting & Construction Co.
National Pole Co.

Poles, Trolley
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equip. Co.
Electric Service Sup. Co.
National Tube Co.

Porcelain, Special High Voltage
Lapp Insulator Co.

Portable Grinders
Buda Co.

Potheads
Okonite Co.

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Westinghouse Elec. & M. Co.

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Ingersoll-Rand Co.

Pumps, Vacuum
Ingersoll-Rand Co.

Punches, Ticket
Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Filler
Philip Carey Co.

Rail Joints
Carnegie Steel Co.
Rail Joint Co.

Rail Joints, Welded
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.

Rail Grinders (See Grinders)

Rails, Relaying
L. B. Foster Co.

Rails, Steel
Carnegie Steel Co.
L. B. Foster Co.

Railway Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

Railway Welding (See Welding Processes)

Rail Welding
Metal & Thermit Corp.

Rattan
Brill Co., The J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Registers and Fittings
Brill Co., The J. G.
Electric Service Sup. Co.
International Reg. Co., The
Ohmer Fare Register Co.
Rooke Automatic Reg. Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
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Electric Service Sup. Co.

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General Electric Co.
Westinghouse Elec. & M. Co.

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Electric Service Sup. Co.

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Columbia M. W. & M. I. Co.

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Westinghouse Elec. & M. Co.

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Consolidated Car Heating Co.

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General Electric Co.
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Haskelite Mfg. Co.

Sanders, Track
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
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Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.

Sash, Metal, Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seating Materials
Brill Co., The J. G.

Seats, Bus
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Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Corp.
St. Louis Car Co.

Second-Hand Equipment
Electric Equipment Co.
Sachsenmaier Co., Geo.
Standard Rail & Steel Co.
Transit Equipment Co.
Zelnicker Supply Co., W. A.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Hubbard & Co.

Shovels, Power
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.

Signals, Car Starting
Consolidated Car Heating Co.
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.
Oskel Equipment Co.

Signal Systems, Block
Electric Service Sup. Co.
Nachod Signal Co., Inc.
Union Switch & Signal Co.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Slag
Carnegie Steel Co.

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Columbia M. W. & M. I. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.

Snow Sweeper, Rattan
Heywood-Wakefield Co.

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Spikes
Amer. Steel & Wire Co.

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Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co., The

Splicing Compounds
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Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Taylor Electric Truck Co.

Sprinklers, Track and Road
Brill Co., The J. G.

Steel Castings
Wharton Jr. & Co., Inc., Wm.

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Steps, Car
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse Elec. & M. Co.

Stop, Signals
Oskel Equipment Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Ohio Brass Co.

Strand
Roebling's Sons Co., J. A.

Subway Boxes
Johns-Pratt Co.

Superheaters
Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

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Ramapo Ajax Corp.

Switches, Safety
Johns-Pratt Co.

Switches and Switchboards
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General Electric Co.
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Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track, Special Work)

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Ingersoll-Rand Co.
Railway Track-work Co.

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Tee Rail, Special Track Work
Bethlehem Steel Co.
Rampo Ajax Corp.

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Electric Service Sup. Co.

Terminals, Cable
Standard-Underground Cable Co.

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Johns Pratt Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

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Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Electric Service Sup. Co.

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Dayton Mechanical Tie Co

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Barbour-Stockwell Co.
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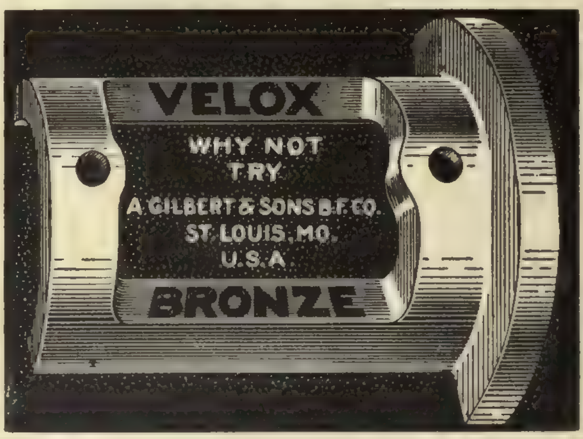
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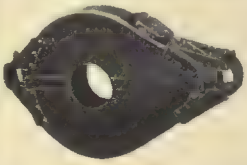

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Railway Track-Work Co.

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Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., Wm.

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Transfer Tables
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General Electric Co.
Westinghouse Elec. & M. Co.

Transmission Towers & Structures
Amer. Bridge Co.

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More-Jones Brass & Metal Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

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Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

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Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.

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More-Jones Brass & Metal Co.
Ohio Brass Co.

Trolley Shoes
Economy Elec. Devices Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wheels, Bushings
More-Jones Brass & Metal Co.

Trolley Wheels & Harps
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co.

Trolley Wire
American Elec'l Works
Amer. Steel & Wire Co.
Anaconda Copper Mining Co
Roeblings Sons Co., J. A.
Rome Wire Co.

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Bemis Car Truck Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co

Tubing, Steel
National Tube Co.

Tubing, Yellow & Black Flexible Varnishes
Irvington Varnish & Ins. Co

Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Turbines Water
Allis-Chalmers Mfg. Co.

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Perey Mfg. Co., Inc.

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Ohio Brass Co.
Railway Track-work Co.

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Electric Ry. Imp. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

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Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
National Ry. Appliance Co
Ohio Brass Co
Railway Track-work Co
Westinghouse Elec. & M Co

Welding Steel
Electric Ry. Improvement Co.
Indianapolis Switch & Frog Co.
Railway Track-work Co.

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Wheel Grinders
Wheel Truing Brake Shoe Co

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Assn. of Mfrs. of Chilled Car Wheels

Wheels, Car, Steel & Steel Tire
Carnegie Steel Co.

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Wheels, Trolley
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Columbia M. W. & M. I. Co
Electric Ry. Equip. Co.
Elec. Service Supplies Co
General Electric Co.
Gilbert & Sons. B. F. A
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Wire Rope
Amer. Steel & Wire Co.
Roeblings Sons Co., J. A.

Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roeblings Sons Co., J. A. Co.
Rome Wire Co.
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in weight, initial and upkeep costs
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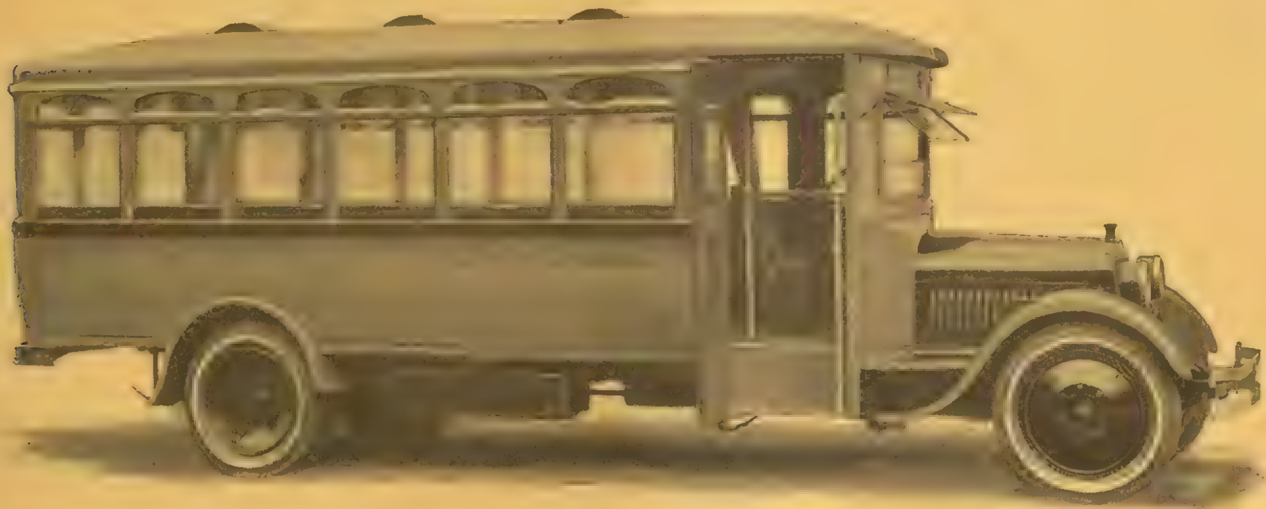
Kuhlman Steel Bus Bodies



New Type "E" Designed for 21, 25 and 29 Passengers

While the new Kuhlman Type "E" Steel-frame Bus Bodies are of pleasing appearance and possess lines which prove attractive to the riding public, their sturdy steel construction is responsible for their continued popularity.

Kuhlman Steel Bus Bodies are built to provide safe public transportation service, the only kind experienced transportation men are interested in, and to insure a length of service which will make the investment a most profitable one. In other words, Kuhlman Steel Bus Bodies stand up well in service.

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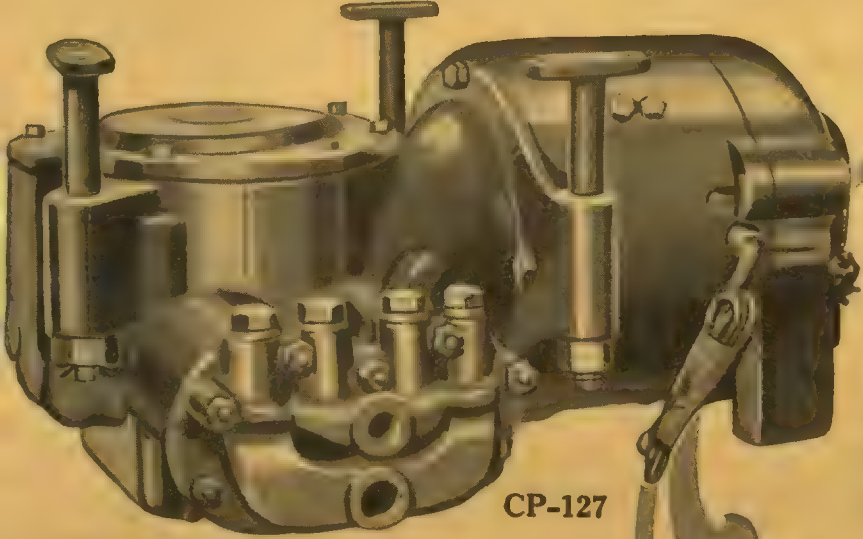

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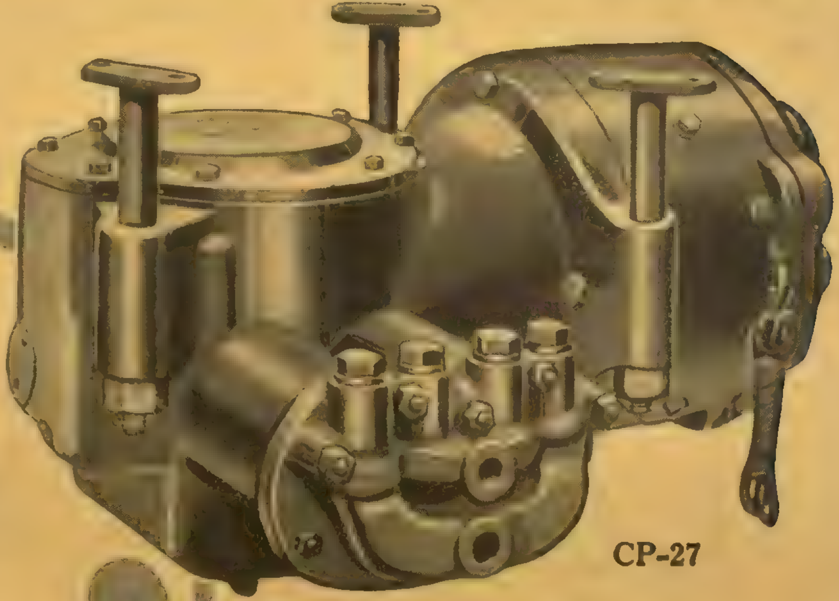
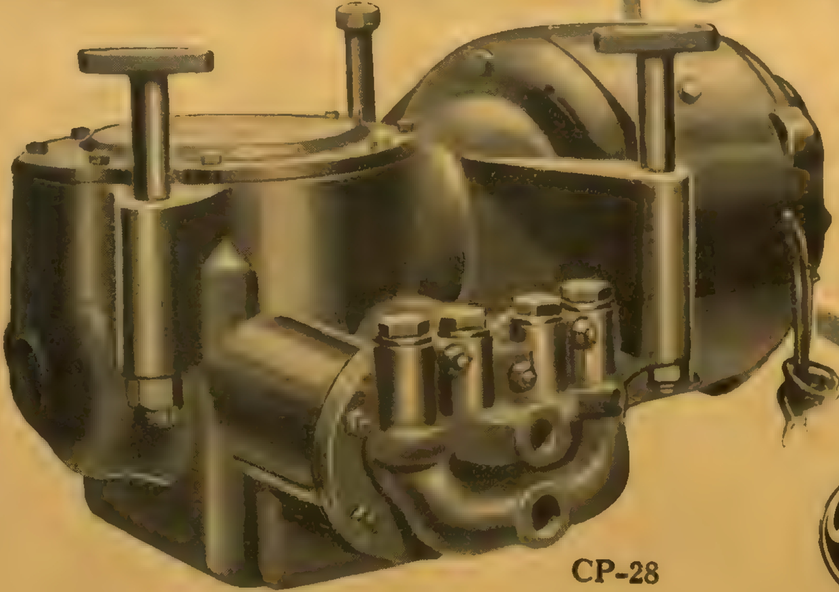


CP-27

THE popularity of the CP Compressor is evidenced by repeat orders—the best recommendation for any machine—received since January 1 for more than 700 new units. The CP line includes designs for any class of service, city or interurban, and the maintenance cost averages only $3 per Compressor per year.



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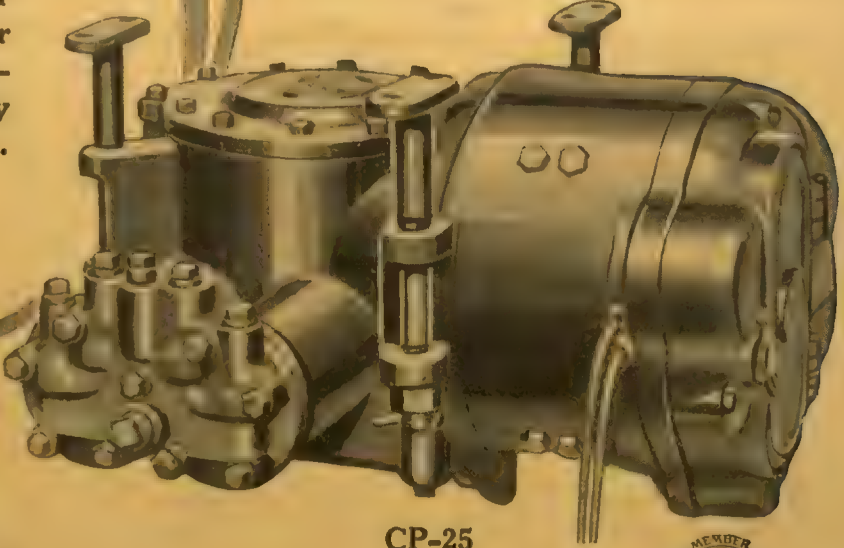

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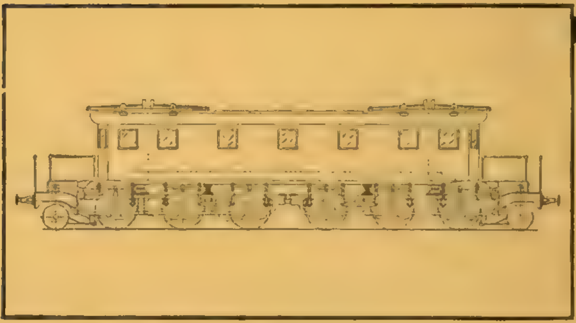
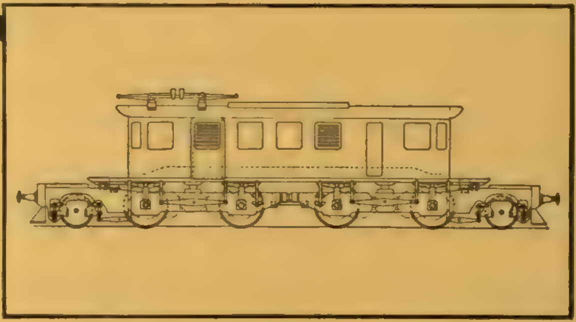
Electrification Progress In Japan

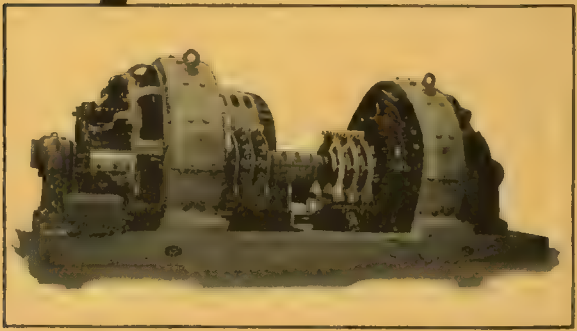
Continuing their progressive program of electrification, the Imperial Government Railways of Japan have recently purchased, from the Westinghouse Electric Company, locomotives and automatic substation equipment amounting to, approximately, 1,500,000 dollars.



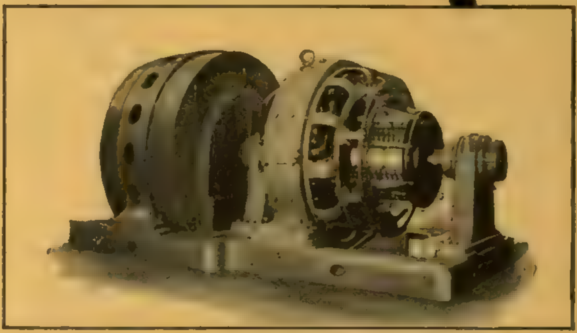
Two 105-Ton, 1500-Volt, Direct-Current Baldwin-Westinghouse Passenger Locomotives.



Six 75-Ton, 1500-Volt, Direct-Current Baldwin-Westinghouse Passenger Locomotives.



Ten 2000-Kw., 1200/1500-Volt Railway Converters with Transformers and Automatic Switching Equipment.



Two 2000-Kw., 1500-Volt Motor-Generator Sets with Transformers and Automatic Switching equipment.

The outline drawings show the types of the 8 locomotives ordered. The photographs show the types of the 10 converters and 2 motor-generators for the substations.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries

Westinghouse

Vol. 64, *No.* 6 New York, August 9, 1924 *Pages* 189-224

ELECTRIC RAILWAY JOURNAL

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In Far-Off Japan

AMERICAN subscribers are apt to think of this paper only in terms of their own needs. This is entirely natural. They take the paper for the help which it gives in solving their own problems. Nevertheless, even considered from this point of view only, the fact that this paper also has a large circulation abroad is of help to the American reader in more ways than one.

In the first place it means that his problem and his solution when described in these columns, comes not merely under the eyes of others in the country interested in the same question, but is brought to the attention of railway managers and engineers throughout the civilized world. This means that to some extent a better solution reached anywhere is available to him.

In another way this world-wide circulation of the ELECTRIC RAILWAY JOURNAL is of benefit to American subscribers. It helps toward world-wide standard methods of doing the same thing. With a concentration of many minds on the same purpose, more progress can be made than if each country was pulling in a different direction.

Each week copies of the JOURNAL—duplicates of those published for readers in the United States—are mailed to subscribers in 50 other countries. In far-off Japan alone there are nearly 200 subscribers eagerly awaiting to learn each week what the JOURNAL has in store for them. If good for them, isn't it also good for you?

Number of Copies Printed, 6,150

Advertising Index—Alphabetical, 58; Classified, 54, 56; Searchlight Section, 53

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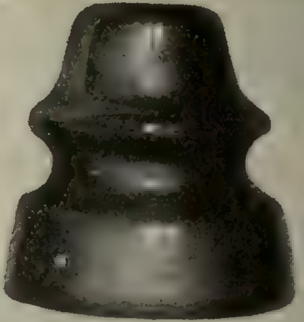
we carry in our district warehouses, ready for immediate shipment, an adequate stock of Porcelain Pin-Type Insulators, as illustrated.



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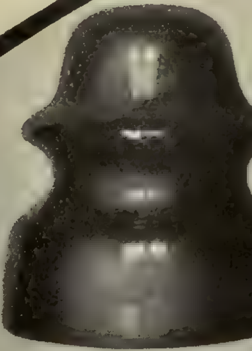

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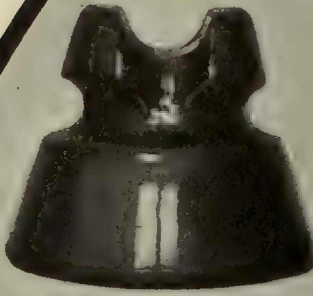

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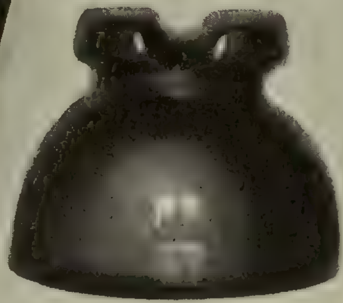

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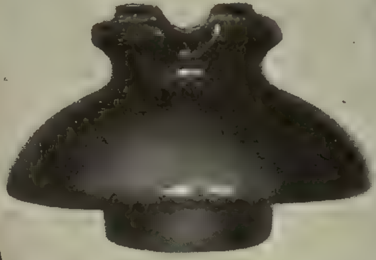

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Westinghouse Electric & Manufacturing Company
Agent for Westinghouse High-Voltage Insulator Company
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Westinghouse

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THESE four booklets are valuable to anyone interested in solving insulation problems. They tell about the various kinds of insulation used in Westinghouse products. Sent free on request. Ask for:

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Sales Offices in All Principal Cities of
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WESTINGHOUSE ELECTRIC

Westinghouse

Mr. Chambers suggests a thought

President F. C. Chambers of the Des Moines City Railway, in his paper presented at the recent meeting of the Iowa Electric Railway Ass'n said:

> **"There is no one thing which will create more dissatisfaction or cause more complaint than irregularity of headways."**

Further on, speaking of unavoidable delays, Mr. Chambers added:

> **"Alterations may be made in operating conditions which will eliminate, to a considerable extent, these delays."**

Suggested thought:—

No one thing is more important in maintaining schedules than the ability to make the maximum safe speed when necessary.

No one thing is more important than good track in making speed safe and comfortable.

No one thing is more important in maintaining good track than adequate welding and grinding equipment.

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(265)

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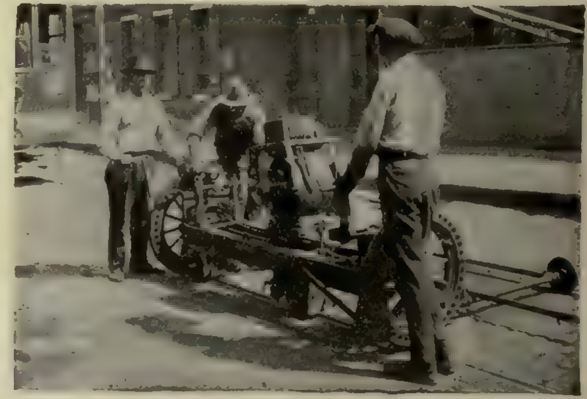

"Universal" Rotary Track Grinder

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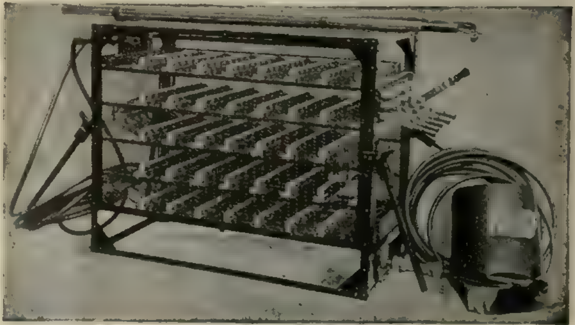
"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder

A MANUFACTURING SERVICE FOR THE INDUSTRY

O-B Metallurgist at furnace with optical pyrometer sighting on ladle.

MELTING FURNACE

O-B Quality demands constant metallurgical supervision at the iron melting furnace. No metal is poured into molds until analyzed and passed by the O-B Technical Department.

Metallurgists are constantly in attendance at the furnace. They insure that every heat taken from the furnace will give castings up to the O-B standard.

The almost unheard of record made in the Ohio Brass Foundry in the way of low losses in castings is the result of this unusual supervision. It means that the castings are uniform in quality and it accounts for the exceptional performance of O-B Products.

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

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Safety Cars mean an *immediate and positive* reduction in operating expense. They can be designed to accommodate as many passengers as other types of cars and to operate on the same schedules; and since operating cost is so sharply reduced, profits are frequently increased 30 to 40 per cent.

BIGGER NET EARNINGS!

Don't put it off—equip your lines with Safety Cars.

If it is not expedient to buy new cars, we can convert your old ones to give you all the benefits of this profitable form of operation.

We have furnished the standard Safety Car Control Equipment since the first Safety Car was built.

10,000 Safety Cars Now in Service

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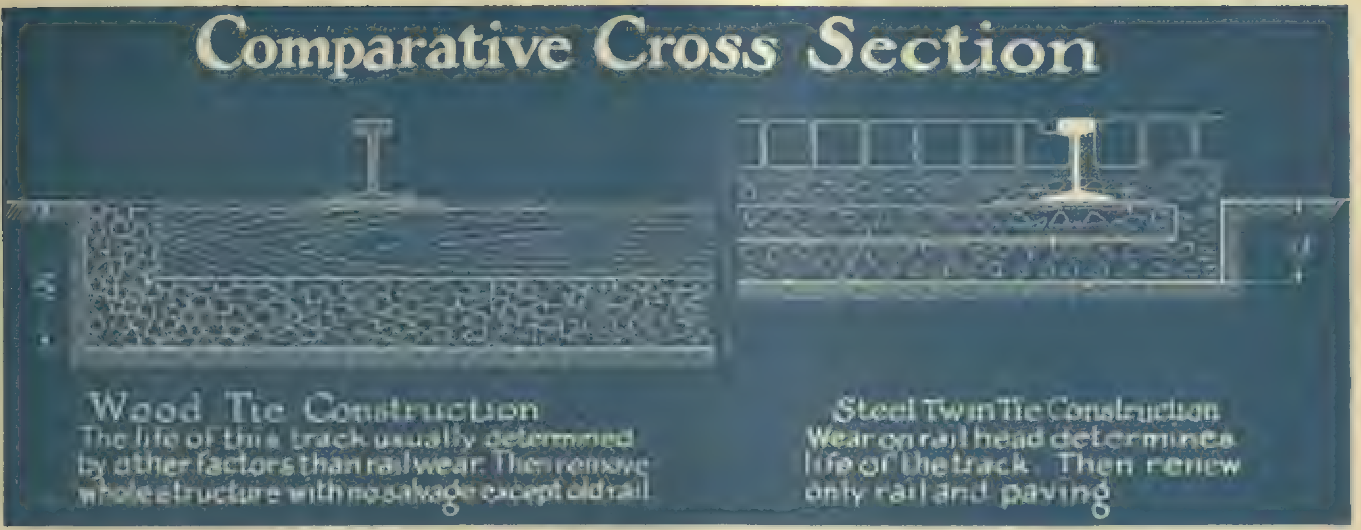
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The life of this track usually determined by other factors than rail wear. Then remove whole structure with no salvage except old rail
Steel Twin Tie Construction
Wear on rail head determines life of the track. Then renew only rail and paving

At the end of the life of the rail a steel tie-concrete foundation has a 100% SALVAGE Value

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The methods of renewal without disturbing the old base have the approval of leading track engineers and have been developed over a period of two years.

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***The* INTERNATIONAL STEEL TIE COMPANY**
Cleveland, Ohio

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Economical — Permanent — Renewable

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The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand.

The use of the brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

SPEED up the schedules of your cars through congested districts, where stops are frequent.

Cut down stopping distance with the Westinghouse Variable Load Brake.

By reducing the time ordinarily required for deceleration when the loads are heavy, golden seconds can be saved at every corner. The faster progress which results is translated into higher daily car mileage, increased earning ability, more frequent service and new expressions of satisfaction from those who ride.

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AIR BRAKE
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for EVERY CLASS
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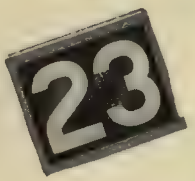

Putting over your service story—

Do you run your cars where people want to go? To the ball grounds and circuses, to the railroad terminals and the parks, to the bathing beaches as well as the city's shopping center? Then why not tell the public so? Consider not only the people who know the routes. Think of the ones who don't know!

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SIGNS

put the story of your service where people can see it. They *advertise* the routes and destinations. They help your cars to compete with the town taxis. They bring in extra fares.

Big, legible lettering, illuminated at night, on roller curtains with space for an almost unlimited number and variety of markings.

Keystone Hunter Signs are an asset of revenue-building value to the railway.

ELECTRIC SERVICE SUPPLIES CO.

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The Tread of the Tire Instead of the Steel Rail

The tracks are in bad shape. The equipment is run down. Delays occur and connections are missed. To modernize the line would be costly — perhaps prohibitive under existing revenue earnings. And yet the line must be held open, the service maintained.

What is the answer?

the Bus is the answer!

The tread of the tire instead of the steel rail.

Railways are continually faced with just such operating and financial problems as these.

For the solution of this problem, railways are turning to the bus and finding the answer. The initial investment is not great. No paving problem. No replacement of overhead. No modernization of power plant. Maintenance (when the right bus is selected) is not costly.

The comfortable, modern bus is, in itself, an invitation to passengers.

In the design of the Mack bus, every factor contributing to efficiency of bus operation, including low operating and maintenance costs and passenger comfort, has been carefully worked out by Mack bus engineers.

Mack buses are *all bus*. The chassis is a specially designed, low-center *bus chassis*. The body is only one step from the ground. The long light springs float in cushions of resilient rubber, an exclusive Mack feature.

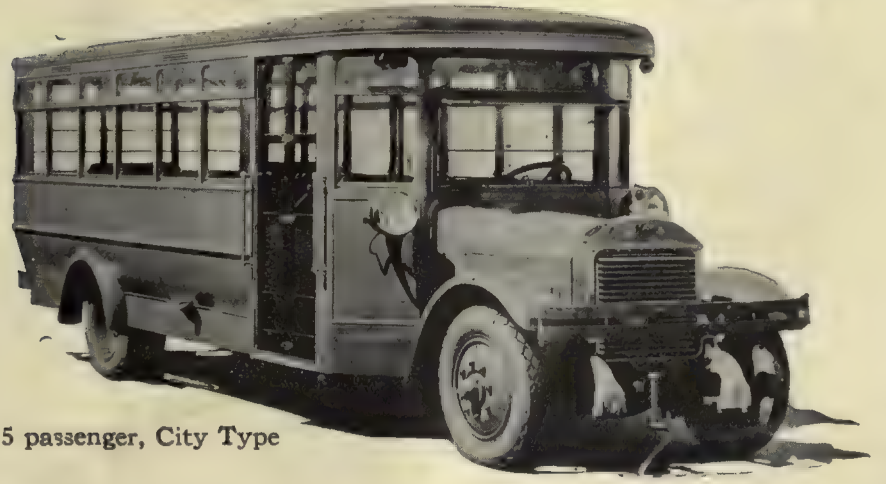
Built for speed, built for comfort, built to stand long continuous running at minimum cost per mile, the Mack bus gives an assurance of service possible only in a bus designed throughout to meet the conditions of bus use.

Mack bus consulting engineers are ready to discuss how bus service can link into your present system.

Mack Trucks, Inc.
INTERNATIONAL MOTOR CO.
25 Broadway New York City
Builders of City and Sedan Type Buses

Eighty-three direct Mack factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus



25 passenger, City Type

Performance counts!

Astoria, Oregon, has replaced its
street car service with buses.

GREATER COMFORT — GREATER SAFETY — GREATER SPEED — GREATER *PROFITS*

Pierce-Arrow Busses have *earned* their Leadership

Standard Chassis

$4600

for 196-inch wheelbase, $4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost.

Terms if desired

Electric railways find the modern, six-cylinder Pierce-Arrow Motor Bus ideal for augmenting or extending their service.

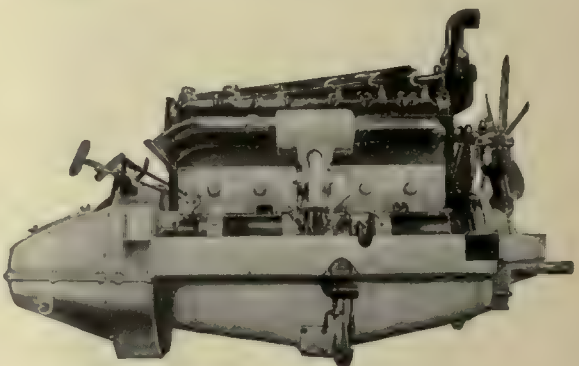
Pierce-Arrow busses earn profits and build goodwill because they afford patrons a swift, safe and economical ride. Passengers *like* to ride in a Pierce-Arrow bus because it actually is more comfortable than a fine limousine. It glides smoothly without noise and without vibration.

Operators like Pierce-Arrow busses because easy control virtually has eliminated driver fatigue—an important safety factor. It seldom is necessary to shift gears; it steers easily, and little effort is required to operate the powerful brakes.

And built into these busses are the established Pierce-Arrow qualities of permanence and reliability—qualities which mean slow depreciation, freedom from abnormal maintenance expense, and the ability to earn money day in and day out.

Our engineers will be glad to demonstrate this modern motor bus and to discuss with railway representatives the facts regarding their transportation ability.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.



The Pierce-Arrow 6-Cylinder Bus Engine

The silent, Dual-Valve, Dual-Ignition Pierce-Arrow Bus Engine develops over 100 horsepower at 2500 revolutions per minute. It is so flexible that gear shifting is reduced to a minimum.

Speed of from 45 to 50 miles an hour can be maintained readily, if desired—which means that lower rates of speed do not tax the engine to the limit.

The bus is propelled by a trouble-free inverted worm gear drive. The low-hung chassis has an unusually short turning radius.

:: :: ::

The Pierce-Arrow Motor Bus chassis, produced in two lengths of wheelbase, will accommodate the Sedan, sightseeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

538

Pierce-Arrow

A Mark of Merit!

N. P.—"National Pneumatic" stands for years of experience, a solidly established enterprise, a line of reliable, durable, proved equipment.

N. P.—"National Pneumatic" Equipment includes door engines, door and step control operating mechanisms, and motormen's signal lights. All timesavers, all safety increasers, all efficiency makers—in short they are all producers.

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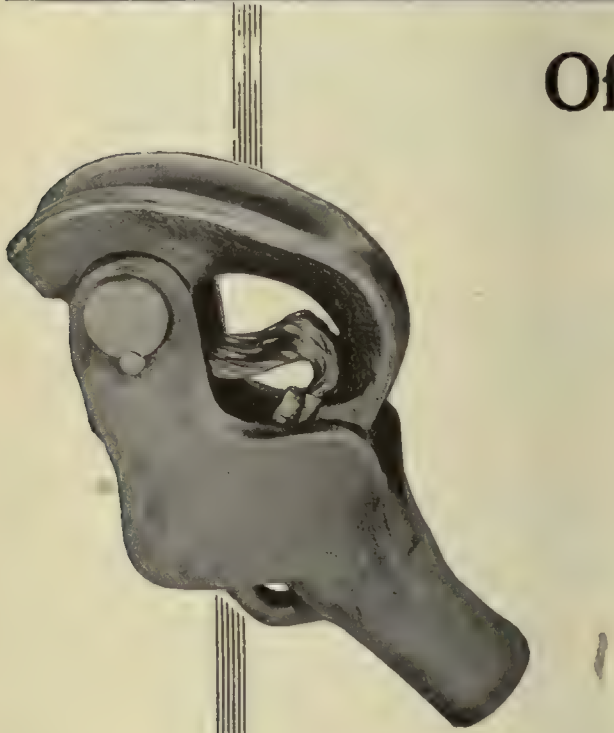
Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.



Of course they are—

MILLER TROLLEY SHOES

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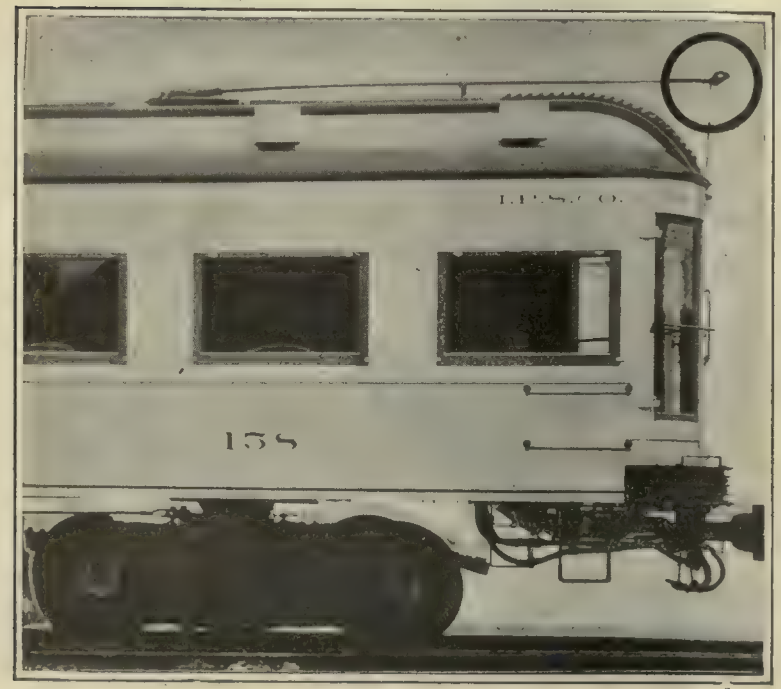
On the Interstate Public Service Company's Cars

Big cars, fast cars, luxurious cars—they're also quiet-riding cars. That disagreeable hum and vibration so commonly experienced on cars where trolley wheels are used is conspicuously absent. Miller Trolley Shoes because of their smooth sliding contact, afford noiseless operation.

Officials of this prominent interurban agree with many other railway operators in reporting that Miller Trolley Shoes give rise to fewer dewirements and cause no more wear on trolley wire than wheels.



Increased mileage
No lubrication
No bushings

Miller Trolley Shoe Company
295 Columbia Road, Boston-21, Mass.

The right stuff in the right spot

Just because this "veteran" maintenance man has been doing this for years, don't be too sure he's doing it the most efficient way.

Galena experts—going from road to road, constantly checking results, constantly comparing data, are posted on all the most efficient practices and the most economical methods.

Galena lubricants correctly applied, are cutting costs on many roads.

Galena lubricants are especially prepared for electric railway requirements. There's a Galena oil or grease or compound for every spot where friction occurs—bearings, gears and commutators on the cars, turbines, engines, generators and auxiliaries in the power plant. Even grease for the track curves is given special attention.

Galena-Signal Oil Company

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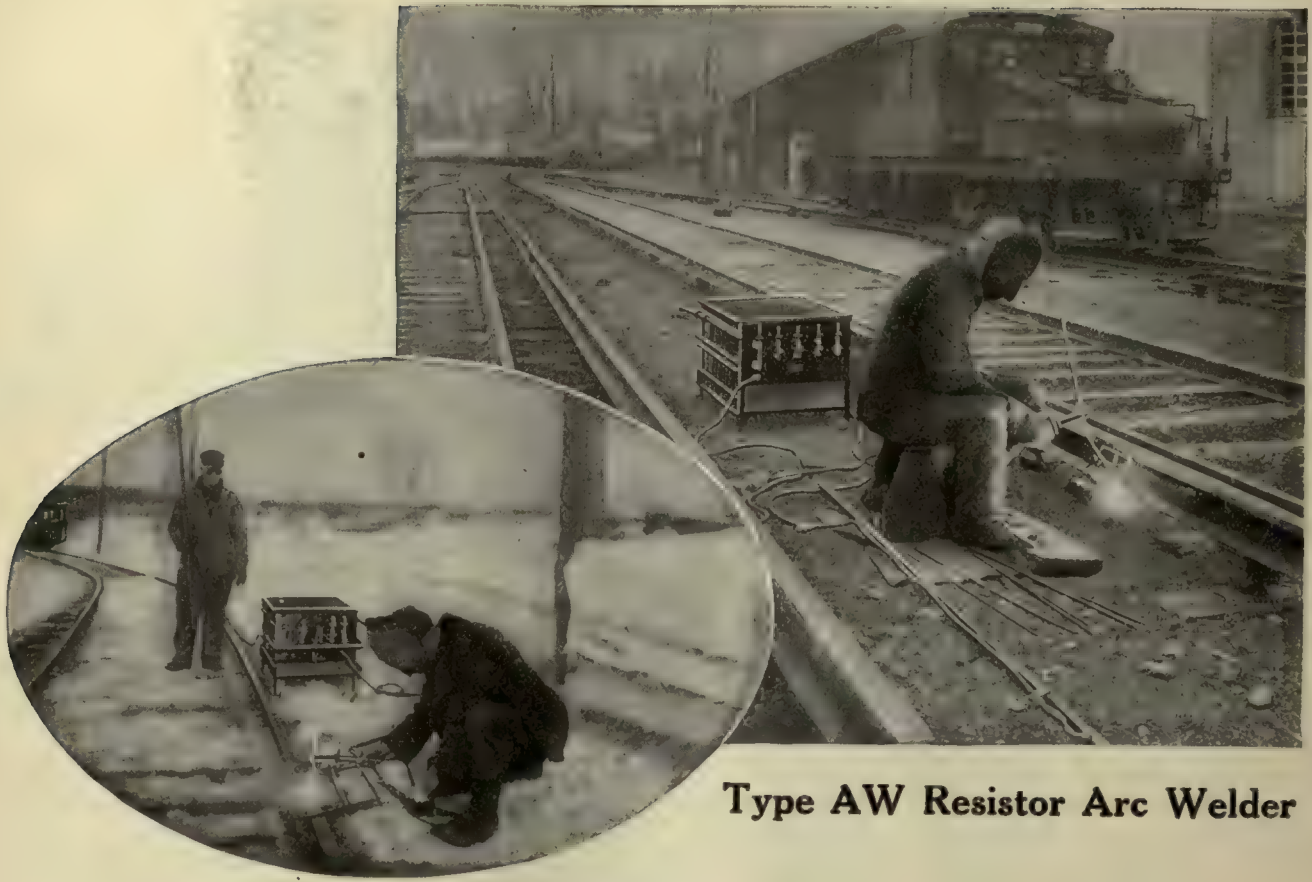

Type AW Resistor Arc Welder

Type AW Arc Welder

- —weighs 140 lbs.
- —does good work in quick time at minimum cost
- —withstands wear of weather
- —specially designed for welding rail bonds, fish plates, etc.
- —operates on 400/650 volts, and welding current can be varied by 15 ampere steps to 60 to 200 amperes.

Ask the G-E sales office nearest you for complete information on your electric welding requirements.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

"It recommended itself on account of its lightness"

—writes a user of the AW Arc Welder. "It is the lightest machine for doing this type of work that we know of, and for the use to which we put it this lightness is a distinct advantage on account of the number of set-ups per day over a considerable stretch of track.

"It has been in service about a year and has performed its work very satisfactorily. We use it on maintenance work where the bonds to be applied are more or less scattered—and with two men put on 60 to 70 bonds per day."

Just hook the Type AW Arc Welder to a trolley wire and you get service that satisfies.

Light weight—easily handled

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GENERAL ELECTRIC

New York, August 9, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
Henry W. Blake and Harry L. Brown, *Editors*

Volume 64
Number 6

The Electric Railways Are Not Going Out of Business

NOTWITHSTANDING the mass of evidence that has been accumulated and published during the present year, there still are a few persons who continue to assert that the electric railways as an industry are moribund and soon will be extinct. All that is necessary to refute such a claim is found in the articles that have been published in this paper in recent months, and a number of excellent articles in the public press.

Broadly speaking, the industry is now in the best condition it has been in for the past ten years. This is not an overnight development, but has been a gradual improvement from the early post-war days when prosperity was abroad everywhere in this country except for the electric railways. Since the dark days of 1919 there has been more and more a realization that the electric railway is one of the basic industries, and that much of our modern city life is dependent on it. Far from becoming obsolete, its patrons are increasing steadily. The year 1923 was the banner one in the history of the electric railways, both for gross revenue and for passengers carried. And this is so even though passengers carried on buses increased at an enormous rate. The per cent of increase of passengers carried on buses looks enormous merely because there has been little to begin with. The same condition held with the electric railways in the early days.

The difficulties experienced by electric railways in the past few years have been of two kinds—low revenue and high costs. That the revenue has been insufficient has not been because it has shrunk. On the contrary, it has shown a continual growth. The difficulty has been that the revenue has been fixed, not by the cost of doing business, but by provisions written in generation-old franchises that were made when the operating ratio was low, even with a 5-cent fare. Look ahead as they might, the managements could not see far enough to visualize costs at two to three times as high as they were then. Most of them felt that they had driven very shrewd bargains.

But there must be an end somewhere. Costs have today stopped advancing and have reached almost an absolute level. This was foreseen in an article published in the Annual Statistical Number of this paper for Jan. 5, 1924, page 18. Between December, 1923, and July, 1924, there has been a drop of 3 per cent in the index of wholesale prices and of 1.4 per cent in construction costs, while electric railway material costs have remained stationary. Electric railway wages have gone up 1.4 per cent, and street car fares have advanced 1.3 per cent. The fluctuations in intermediate months all lie between these limits, indicating a very stable condition. Even though the fares have not risen proportionately with costs, improved management, with the introduction of economies and more intensive cultivation of the riding habit, have made it possible for the progressive companies to make showings of net income that compare very favorably with pre-war statements.

The demand for electric railway securities continues unabated. As was pointed out in an article in this paper for July 26, new issues totaling nearly $50,000,000 were issued on terms favorable to the railways during the first six months of the year. Here is concrete evidence that the industry is viewed with favor by investors.

As evidence of how favorably the industry is looked on today, many newspapers are spreading the information that the industry is once more on its feet. One of the best examples of this is the series of articles by Paul Willard Garrett published in the New York *Evening Post* recently. This writer, who is well known in financial circles, concludes that "it is safe to say that the industry is working into a stronger position and that traction securities, properly chosen, occupy a better market position than they have for some time. The future in many cases is positively bright. In weathering the storms of recent years, the industry has learned better how to avoid trouble. Not only that, the business has been put upon a sound basis, a thing which brightens the outlook for traction securities."

Where the Bus Fits Into the Picture

IN THIS discussion of the future of the tractions, no mention has been made of the place the bus will take. This has been stated in these pages many times. Today the truth of the statement in an editorial published on Jan. 5 is more apparent than ever before, that the leading men of the electric railway industry and the principal bus manufacturers will dominate the bus situation in its major operations and that the electric railways are to be the great market for buses. Out of some 75,000 sq.ft. of exhibit space already applied for at the October convention of the American Electric Railway Association requests for 30 per cent of the space are from bus manufacturers.

With this great field before them the bus men need have no fear that they will not have the opportunity to develop business. While it is conceded that the bus cannot be compared with the street car for the great bulk of the transportation requirements, it is likewise true that with the high costs of electric railway construction there are many localities where street car service has not been given, though the residents are demanding transportation. Usually these are localities where the traffic is not dense enough to support rail lines. In the aggregate this amounts to a very material extension to the existing service. Chief among these areas requiring service are suburban districts. While the street car can be operated at less cost if the traffic is sufficiently dense, nevertheless no service or an indifferent service is being given in many areas that should have transportation of the high grade that can be furnished only by the recognized agency—the street railway. The bus is a means of furnishing this service so that the railway will be able to meet the just demands of the public without having to make the tremendous investment that would be necessary to extend its lines at present prices.

This is just one of the uses of the new vehicle. De luxe service, sightseeing routes, boulevard and park lines—all these are fields where the railway may well use its new ally. In interurban territory, too, there is a similar field where special service of this sort may be given. In fact, a number of progressive railways already are providing it.

The possibilities are large and the way has but recently been opened. With co-operation between bus manufacturers and co-ordination of the two services by the railways, there is without doubt a bright future for the new vehicle. And in the readjustment the public cannot help but be the gainer.

The Real Measure of Transportation Service

FREQUENT and regular service—every electric railway man knows how desirable that is. In the morning when the superintendent of transportation sees on his desk a record showing correct and even headways on his various lines the preceding day, he feels gratified. But it is often worth while to look below the surface of records to see whether or not they really mean good transportation service provided for the public.

It may be taken for granted that headway checks made on the streets by inspectors are accurate. To make them so is a mere matter of discipline in the organization. But service means more than having a good headway on paper. It means providing transportation at the places where it is wanted and at the times when it is wanted.

An example that can be cited to show the danger of placing too much emphasis on a paper headway is the case of a heavy suburban line where the inspector was accustomed in the afternoon rush hour to turn back inbound cars at the outskirts of the city. By so doing he avoided having a serious gap in the outbound headway at his particular checking point, but, because the traffic on this line originates almost entirely in the center of the city, his plan resulted in taking away cars from the very point on the line where they were most needed.

Another example is the practice of short routing cars unexpectedly and compelling through passengers to change. On a short headway this procedure may take longer and cause a bigger gap than the one it was intended to correct. There can be no fixed rule in these matters that will tell the supervisory force when it is worth while to juggle the headway and when it is better to leave it alone. But if it is always borne in mind that the facilities provided on the street are the real measure of transportation service, inspectors are unlikely to make serious mistakes.

It Can Pay the Public to Be Patient

WHEN the Bay State Street Railway was reorganized as the Eastern Massachusetts Street Railway and placed under the management of state trustees in September, 1919, the latter announced that the property would be divided into areas that would have to be either self-sustaining or quit if the deficits were not made up, at least in part, from local taxation. Most of the districts saw the justice of the plan and went along with the trustees.

One recalcitrant was Gloucester. After attaining a loss of $74,000, the trustees shut down the service on June 20, 1920. A number of private, unregulated jitneys followed. In December, 1920, the citizens of Gloucester voted 4,492 to 1,101 in favor of bus operation rather than pay a 10-cent trolley fare and make up $20,000 of the deficit. As jitney operation proved unreliable, a regulatory ordinance was passed on Feb. 6, 1921. The Gloucester Auto Bus Company had been organized in December, 1920, but it was not until May 1, 1921, that this company secured a general monopoly of bus transportation in Gloucester and environs. In 1922 its city franchise was renewed for three years.

It is well to ask the question, "What did the public gain, if anything, in the switch from trolley to motor bus over the same routes?" Since the 10-cent fare was such a bone of contention, one would expect that the bus fares would be lower. Such is not the case. The minimum adult fare is 10 cents cash or 12 rides for $1 net. On the other hand, the trustees have made such a good job in reorganization of the railway elsewhere that they are selling reduced-rate tickets giving from 13 to 20 rides for $1 in the different districts.

No data are available as to whether the bus company is making money on its operations in the Gloucester city zone, but it has recently declared that it lost $4,850 or 6.3 cents a mile on a 20-cent route between Gloucester and Magnolia. Evidently the public is not feeling more kindly toward the bus company than Gloucesterites felt toward the railway, for the attorney for the bus company is quoted as saying: "It is amusing when people say we have a monopoly, when in reality we have something in which we are losing money." How familiar this sounds! Strange that the public should feel this way after five successive bus operators from 1910 onward had been unable to make ends meet. The Magnolia run is to a summer community, one that the railway never even tried to serve because of the sparse population, yet the public has been unwilling to support bus operation thereto at any fare, whether 50 cents or 20 cents.

As to the financial benefits to the city of Gloucester, it may be noted that when the railway was operated the city secured substantial taxes including a charge for paving. What does the city get from the bus company? All of $10 a year per bus licensed and $1 a year per driver!

Bearing in mind what the trustees of the Eastern Massachusetts Street Railway have done elsewhere in lowering fares, improving service, restoring track first abandoned and operating buses to supplement instead of supplant existing transit investment, it is fair to assume that if the public of Gloucester and vicinity had shown the confidence and patience that other districts manifested toward the public management the fares would be less and tax revenue greater than it is.

Fort Wayne Builds Modern Carhouse

New Structure of the Indiana Service Corporation Cost $125,000 and Provides Convenient Inspection Facilities and Wash Room—Second Floor Is Used for Offices and Recreation Rooms for Employees—The Final Development of the Property Will Include Repair Shops at a Total Cost of Half a Million Dollars

Modern Inspection Shop and Wash Room of the Indiana Service Corporation, Built of Red Brick with White Limestone Trimmings

A WELL-LIGHTED and well-equipped car inspection shop has recently been completed by the Indiana Service Corporation, Fort Wayne, Ind. This building is the first of several which will be located adjacent to the power house on the Spy-Run property of that company. Buildings already on the property include the power house, maintenance-of-way shops, paint shop and the recently completed carhouse. In addition to the buildings, extensive trackage has been constructed for a storage yard. Further improvements will include a repair shop and such small buildings as are necessary for the most efficient operation of the interurban and city lines.

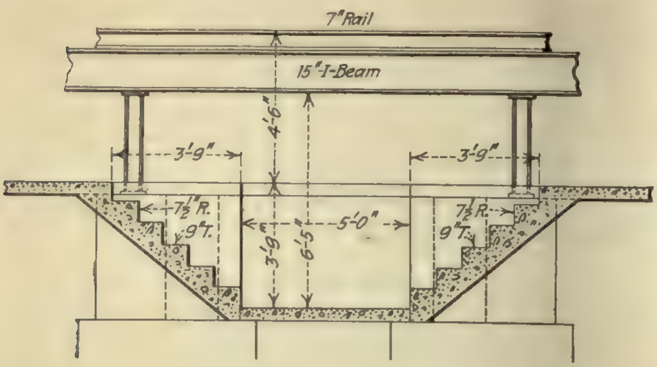
The car inspection shop occupies the main floor of a two-story building 252 ft. x 52 ft., the second floor of which is to be used for offices and recreational purposes. Adjacent to the north side of the main building, with a wall common to both, is a one-story wash house of the same length as the other but only 23 ft. wide. The construction of this one-story building is such that a second story may be added if requirements necessitate. The interiors of the buildings present a pleasing, well-lighted appearance, the side walls and posts being painted a dark green up to a height of 6 ft., above which the walls and ceiling are white.

The main floor of the two-story building has three tracks, which extend the entire length. Each track has an inspection pit extending from within 15 ft. of one end of the building to within 15 ft. of the other. The floor on each side of the three tracks in the inspection shop is 12 in. below the top of the rail. Ramps have been provided connecting with the normal floor level. The ceiling is 16 ft. 6 in. above the floor and is supported in the inspection shop by means of two rows of columns.

The construction of the building is fireproof throughout and all steel work, with the exception of the second floor supporting columns, is incased in concrete. Side walls are of red brick on the outside with building brick inside. The pilasters of the two outside walls and the dividing wall between the inspection shop and wash room are spaced 22 ft. 10 in. apart and have a supporting steel column as an integral part of their construction. The second floor is carried on these steel columns and upon two rows of "H" beams spaced 22 ft. 10 in. centers down the aisles between the tracks in the inspection shop. The span of 23 ft. in the wash room does not require any intermediate supporting columns. In the inspection shop the columns are 8-in. x 6-ft. 5-in., 23.5-lb. "H" section steel members and extend through the main floor to the sub-floor, 3 ft. 7 in. below. Here the columns have been set on individual foundations. The dividing wall between the two rooms is of the same construction as the outside walls and has a passageway 6 ft. wide x 8 ft. high at each end of the wall, closed by means of a steel sliding door.

HANDY ARRANGEMENT OF PITS

One of the interesting features of the design is the construction of the main floor in the inspection shop. The pit construction is open. The main floor is reinforced concrete, 7 in. thick, laid upon steel framework. The floor of the pit, which is also concrete, is continuous from the outside wall to the dividing wall with the



Cross Section of a Transverse Pit

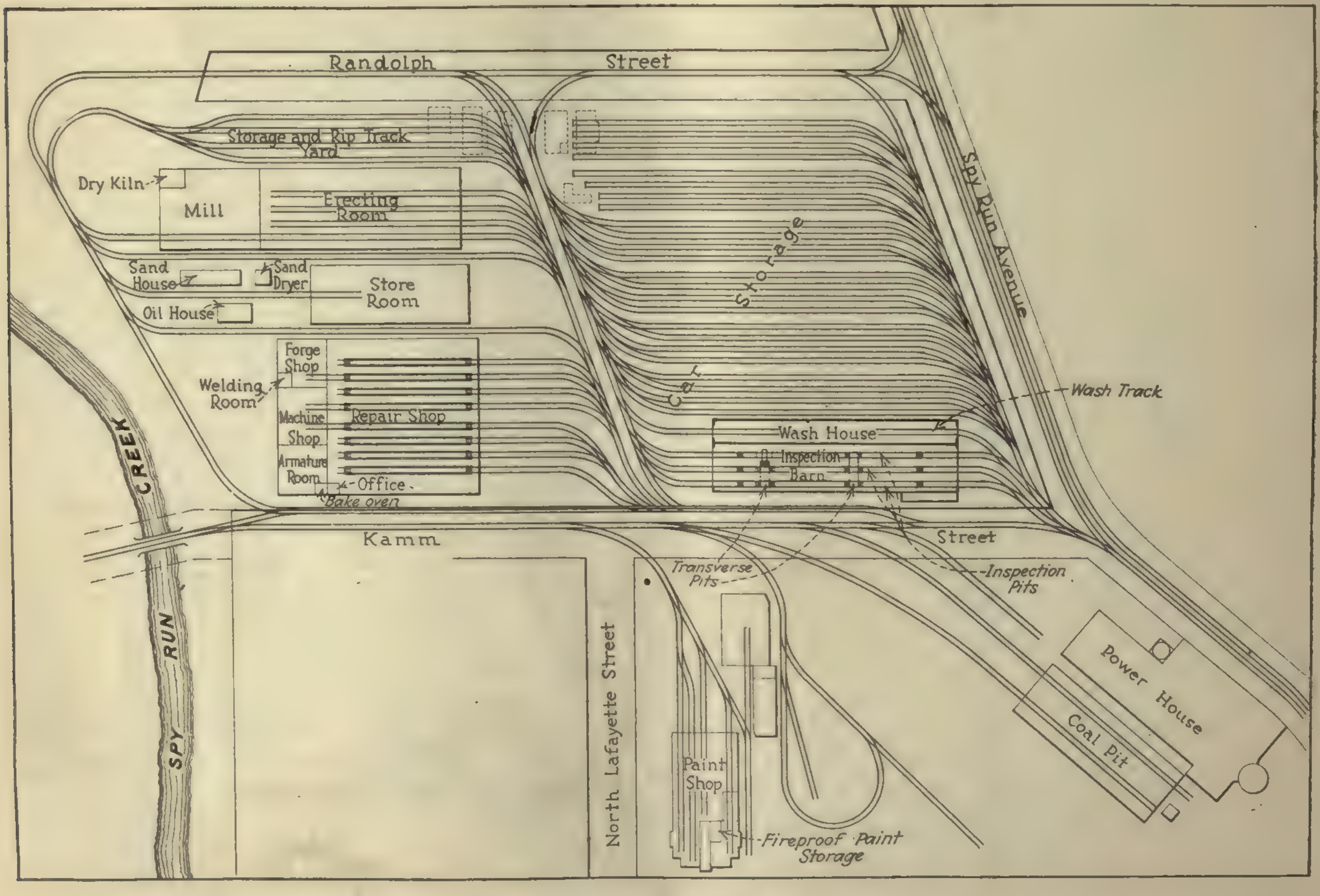
wash room. The reinforcement of the main floor is 6-in., 12½-lb. I-beams spaced 3 ft. 10 in. centers. These members are fastened to the 15-in., 46-lb. I-beam rail supports so that the lower edges of the two are flush. The 15-in. I-beams are the longitudinal members of the floor structure and form the sides of the pit opening. They are supported every 11 ft. 5 in. by a 6-in., 20-lb. "H"-section column. The latter are set on individual concrete foundations similar to those which support the intermediate second floor supporting columns. The pit running rails are mounted on the top flange of the 15-in. I-beam. This type of floor construction is sufficiently strong to accommodate the heaviest locomotive on the system.

With this design of main floor construction, the floor of the pit is 3 ft. 7 in. below the main floor, while at the same time it is 4 ft. 7 in. below the top of the running rail. Two transverse pits connect the three longitudinal pits. One of the transverse pits has been located at the center of the building and the other near one end of the longitudinal pits. These pits have a floor level 3 ft. 9 in. below the floor of the longitudinal pit, thus providing a convenient passageway from one working pit to another. Concrete steps connect the main floor level with the longitudinal pits at the ends of the latter. Steps have been provided also between the longitudinal pits and the transverse pits, which are at the lower level.

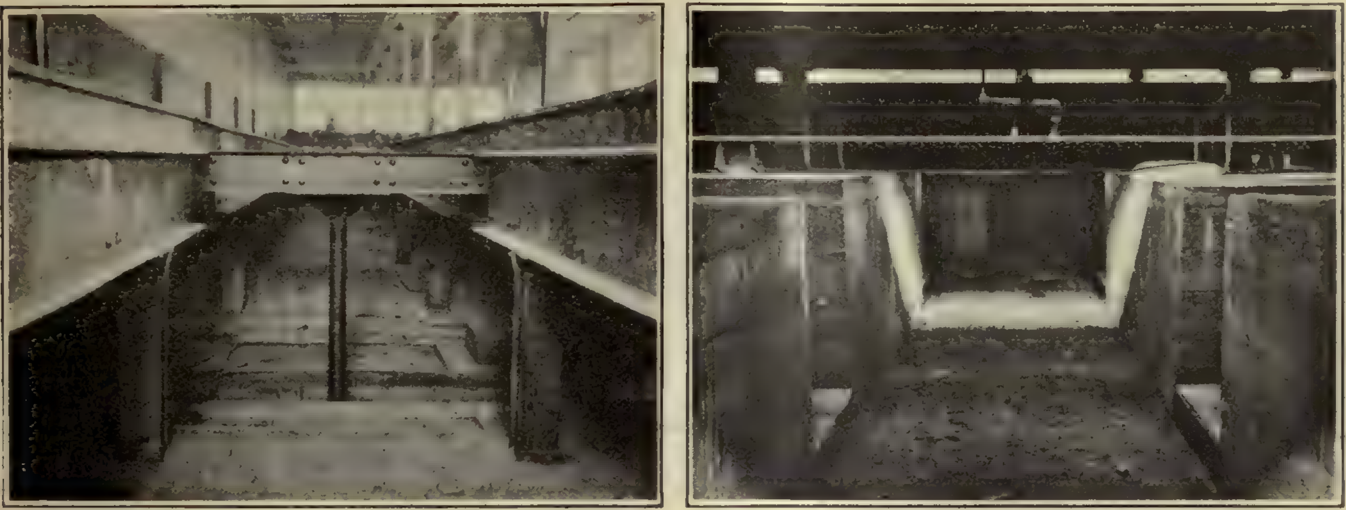
Each pit is provided with two drainage troughs, one on each side, directly under the edge of the I-beam. These drains connect with a catch basin located in the lower level cross pit. Thus there is little possibility of water collecting in the pits and hindering the work of the men. Drains have been provided also on the main floor level.

The outside walls of the building have 40 per cent window space. The panes are clear glass set in "Fenestra" standard side wall steel sash. Each bay has a 16-ft. 1½-in. wide x 10-ft. 3½-in. high section made up of 14-in. x 20-in. panes. This same construction is used on the north wall of the one story wash room. At both ends of the two rooms are swinging steel doors, manufactured by the Detroit Steel Products Company, with the upper two-thirds of the door area equipped with small panes of clear glass. These doors are 15 ft. 16 in. high and each section is 3 ft. 6 in. wide, four sections constituting a single track opening. They are hand-operated and move very freely on a hanger at the top. This type of door has added materially to the convenience of the inspection shop inasmuch as it admits considerable light at the ends of the building, even when closed.

At night illumination of the inspection shop and wash



General Layout of the Spy-Run Shops and Storage Yard



Transverse Pits Connect the Longitudinal Pits. At the Left a Columbia Wheel Drop Is Shown at the End of One of These Transverse Pits

room is accomplished by the use of 200-watt lamps set in dome reflectors mounted approximately 13 ft. above the floor level. In the inspection shop there are four rows of 11 lights each, one row being over each aisle adjacent to the tracks. In the wash room there are two rows of 11 lights each. This system of lighting produces an illumination of approximately 6 foot-candles on the floor level. In addition to the ceiling lighting the pits are illuminated by means of lamps, one in each bay, mounted on the underside of the I-beam rail support on one side of the pit. These lamps are of 23-watt capacity and are protected by means of wire cages. Adjacent to every third lamp is a receptacle for receiving a trouble lamp plug. These receptacles are of special design, having a spring cover.

To expedite the work of changing wheels a Columbia wheel drop has been installed in one of the inspection pits at an end of one of the transverse pits. This hoist moves a 3-ft. section of track to a lower level where storage space for two pairs of wheels has been provided. No crane or hoists have been provided inasmuch as it is to be used only for inspection purposes.

Washing facilities for rapidly and efficiently cleaning cars are provided in the wash room by numerous water outlets and adequate drains. Water conditions are such in Fort Wayne that it was necessary to provide duplicate sets of piping in order to furnish both city water and river water. The city water is drawn from rock wells and is very hard. The close proximity of the river to the power house and carhouse made it exceptionally easy to provide soft river water for washing purposes. It is planned to use the river water for the initial washing and the city water for rinsing purposes. Outlets for the hard city water and the soft river water are placed every 25 ft. on each of the wash rooms. Faucets have been provided with threads in order that a coupling may be made with hose or special washing devices. An auxiliary water supply has also been provided which furnishes hot and cold specially treated water in quantities sufficient for special washing purposes, requiring small quantities of water. This water is available at one end of the shop only. It was originally brought into the building for use in the shower baths and wash basins on the second floor but it was thought advisable to make the same type of water available in the wash room.

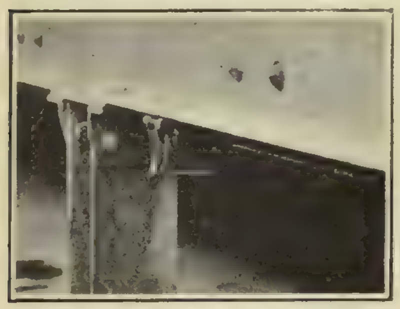
In the design of the building careful consideration was given to the heating facilities in order to provide a place to work which would be comfortable at all times of the year. Close proximity to the power house permits the use of live steam through a reducing valve. The usual type of wall-supported radiators are located under the windows both in the main inspection shop and in the wash room. The radiators in the inspection shop have a heating surface of 1,800 sq.ft., while those installed in the wash house have a heating surface of 1,170 sq.ft.

An unusual feature of the heating arrangements is the additional heating area provided by radiators located under the floor in the inspection shop. These are ceiling type radiators, placed on each side of each inspection pit. This auxiliary system has a total of 1,080 sq.ft. for radiation and may be turned on in sections for each track whenever occasion demands. This permits warm air to circulate directly from the pit against the under rigging and floor of the car. With this heating system in operation, it is hoped that the men will be able to work on the brakes and motors of the cars in the winter time, almost immediately after the car is placed in the shop. Warm air being drawn up and around the car will help to melt off the ice and snow accumulated on the car during the winter months. The entire heating system is operated at a pressure of approximately 2 lb. per square inch and maintains a temperature within the building of 70 deg. F. when the outside temperature is zero.

On the second floor of the building are to be found the offices of the transportation department and recreational rooms for the use of the company's employees. The stairway opens into a lobby on the second floor, from which open offices, shower rooms, locker rooms and

The Interior of the Inspection Shop Is Well Lighted, 40 per Cent of the Wall Area Being of Clear Glass toilet rooms. A hallway connects this lobby with recreational rooms located at the center and at the far end of the floor. Directly at the end of the hall is a room with space for three billiard tables and four bowling alleys. Beyond this is located an auditorium with a stage and dressing room at the far end. The doors and interior trim of the second floor are of steel, furnished by the Variety Manufacturing Company.

The appointments of the shower, locker and toilet rooms are the best. The floor in the shower and toilet rooms is raised 6 in. and is covered with white tile. The floor construction is of 6-in. sheared I-beam, reinforced concrete, covered with a Terrazzo surface. However, in the auditorium a hard maple flooring has been laid. The roof is supported on truss spans, 52 ft. long, with a sheared I-beam reinforced concrete roof, upon which is placed 5-ply felt, pitch and gravel.



Trouble Cord Receptacles of this Type Are Located 45 Ft. Apart Along the Pits

The building is of simple design, with nothing fancy about either the exterior or interior. The details of the building were laid out by the engineering department of the Indiana Service Corporation. All of the construction work was done by the company with the exception of the heating and plumbing systems, for which contracts were let to outsiders. The total cost of the building is $125,000, while the entire Spy-Run plan will ultimately involve an expenditure of $500,000 when completed.

Underground Garage One Way Out

AN UNDERGROUND garage in Grant Park, on Chicago's downtown lake front, housing 3,000 automobiles, is the latest plan of various clubs and business organizations to help in relieving the city's traffic congestion.

It is particularly designed to further the projected plan of the Mayor's safety commission, whereby all parking on downtown and car-line streets is to be abolished. The garage is to be the answer to the question: If we can't park our cars on the street, where can we put them?

The garage is to be sunk below the surface of the earth a distance of about 6 ft. It is to be constructed in units, each unit capable of holding 306 cars, according to a plan that already has the tentative approval of a committee.

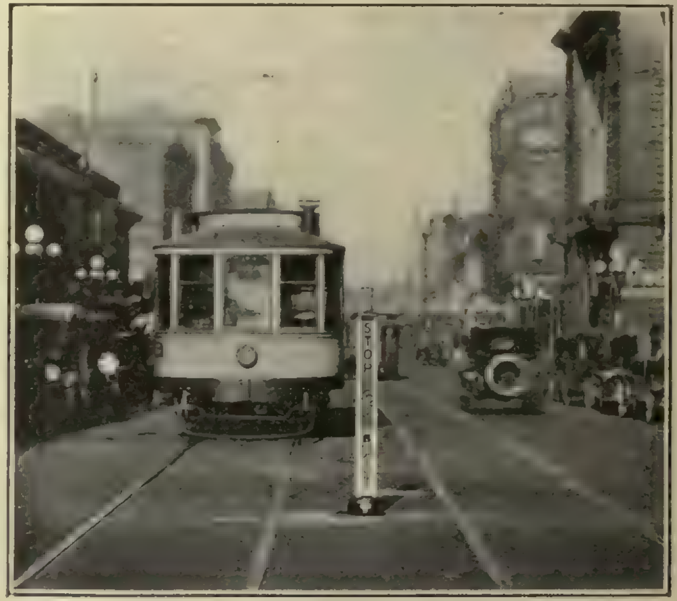
Permission of the board of directors of the South Park commission to erect the garage must first be obtained, but in preliminary conferences, the directors have signified their willingness to permit the construction of such a garage as will meet with the approval of their engineers and which can be constructed without the aid of park funds.

One Chicago motor club has already signified its willingness to underwrite a bond issue of $1,000,000 for the first unit of the garage. In accordance with this plan, after the garage has paid for itself out of the fees collected each day from the motorists who park their cars it will be turned over to the park authorities.

Traffic Signal Designed to Stand Between Tracks

AN AUTOMATICALLY operated traffic control signal, so designed that it can be placed between the tracks of the street railway without interference to the passage of cars, was recently installed in Minneapolis. It consists of a slender square post mounted on a cast-steel ball. The post bears the customary words "go" and "stop" cut through the metal of the sides. The openings are covered by glass so that the flashing on and off of the lights inside of the post illuminates the words in different colors.

The steel ball at the bottom of the post fits into a steel plate flush with the pavement. Underneath this plate there is an arrangement of springs to hold the post in a vertical position. These springs are flexible enough, however, so that the post yields if struck by a passing vehicle. Mechanism controlling the signal is housed in a steel cabinet at the curb, and the working parts are unaffected when the post is struck.



The Dimensions of This Traffic Signal Permit Placing It Between the Tracks at Street Intersections

Two advantages are claimed for this signal. In the first place it is superior to a signal located at the curb or one suspended overhead from span wires, because it is more likely to be seen by drivers of vehicles. In the second place if a vehicle accidentally runs into it no serious damage is done either to the vehicle or to the signal, whereas collisions with steel or concrete posts are likely to be disastrous.

The Twin City Rapid Transit Company considers that this traffic signal is superior from a street railway standpoint to any of the others that have been placed at various points throughout the city of Minneapolis. Although the clearance between cars is approximately 10 in., no difficulty is experienced in operating where these signals have been installed. The signal is manufactured by the Griswold Safety Signal Company, Minneapolis, Minn.

Municipal Buses Waiting for Passengers at Chambers Street Ferry, Lower New York

Coach and Bus Operation in New York

The Fifth Avenue Coach Company and the Municipal Buses Give Quite Different Kinds of Service—Statistics of Each Are Compared with Those of Surface Lines in New York

By John A. Beeler

Director the Beeler Organization, Public Utility Consultants,
New York

MOST readers of this paper are acquainted with the transportation service supplied in New York by the Fifth Avenue Coach Company, but as large a number may not be familiar with the routes and service of the municipal buses in New York City. Nevertheless the number of passengers carried by the latter annually approximates if it does not exceed in number those carried by the Fifth Avenue Coach Company. A review of the bus situation in Manhattan and Bronx boroughs follows:

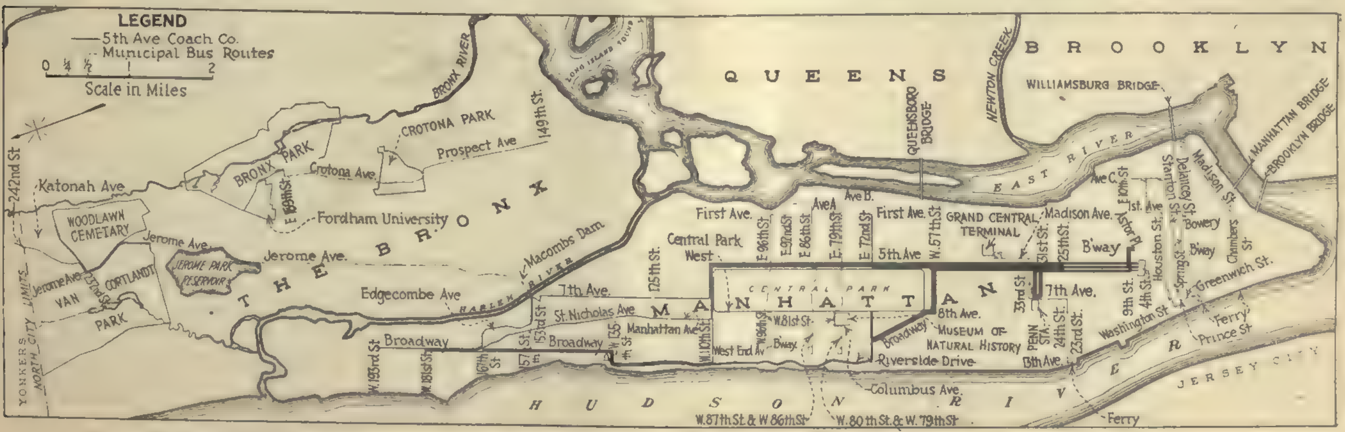
FIFTH AVENUE COACH COMPANY

The Fifth Avenue Coach Company is a privately owned concern controlled by the New York Transportation Company, which, until recently, was a subsidiary of the Interborough Rapid Transit Company. In common with all privately owned public utilities, it renders periodical statements to the Transit Commission so that reliable information regarding its operations is available.

The company operates 10 routes in Manhattan and the Bronx, as shown in the accompanying map. The streets used, like Fifth Avenue and Riverside Drive, are generally wide and well paved. A 10-cent fare is charged, with free transfers good at designated locations, such as short line points and points of divergence.

Most of the coaches are of the double-deck type with the upper deck open and are operated with two men on a coach. A few of the coaches have the upper deck inclosed. The double-deck coaches seat about 48 passengers. The company also operates a few inclosed, single-deck, one-man coaches. A total of 293 coaches are scheduled for daily service, about 60 per cent of them being scheduled in the base service. The base headway on most of the lines is 10 minutes. This results in about a 30-second headway on lower Fifth Avenue in the normal hours. In the rush hours the combined headway in this section is less than 20 seconds.

The company's 1923 balance sheet shows that at that time it had an investment in operating equipment, including real estate, of $3,611,621 and total assets of $6,875,941. Included in its outside investments are $2,568,168 in United States government securities. As the capital stock of the Fifth Avenue Coach Company is the nominal amount of $50,000, the company's sur-



Map Showing Routes of Fifth Avenue Coach Company and Municipal Buses in Manhattan and Bronx plus account in the 1923 balance sheet was $5,816,780. A condensed summary of operations for the years 1922 and 1923 showing the revenue, operating deductions and net income of the Fifth Avenue Coach Company is presented in Table I.

Comparative operating statistics for the past four years, as set forth in Table II, show that the total revenues, bus-miles and revenue per bus-mile are climbing steadily. The speed also is better than it was four years ago, and the operating ratio is declining steadily. It will also be noted that the net earnings, after all charges available for interest, have increased from 9.3 cents to 12.69 cents, or 36 per cent in four years. The company charges off 10.40 cents per bus-mile to cover the cost of maintenance and depreciation of equipment. In round figures during 1923, 18 per cent of the revenue went to maintenance and depreciation, 43.5 per cent to transportation costs, 7 per cent to general and miscellaneous including damages, 10 per cent to taxes, and the remaining 21.5 per cent to net income.

General operating features for 1922 and 1923 have been grouped in Table III. The company carried dur-

TABLE I—FIFTH AVENUE COACH COMPANY—SYNOPSIS FROM ANNUAL REPORTS

	1923	1922	Cents per Bus-Mile 1923	Cents per Bus-Mile 1922
Revenue:				
Passenger	$5,597,411	$5,284,013	55.86	54.57
Chartered car	12,326	11,451	.12	.12
Advertising	100,820	94,851	1.01	.98
Miscellaneous	....	98	.....	....
Total	$5,710,557	$5,390,414	56.99	55.67
Non-operating (net)	126,639	98,696	1.26	1.02
Total revenue	$5,837,196	$5,489,110	58.25	56.69
Deductions:				
Operating expenses:				
Maintenance (a)	$1,045,937	$888,874	10.44	9.18
Transportation	2,529,292	2,406,959	25.24	24.86
Injuries and damages (b)	199,781	206,523	1.99	2.13
Miscellaneous	203,891	208,395	2.04	2.15
Total operating	$3,978,821	$3,710,751	39.71	38.32
Taxes	586,223	610,358	5.85	6.31
Total deductions	$4,565,044	$4,321,109	45.56	44.63
Net income	$1,272,152	$1,168,001	12.69	12.06
Dividends	320,000	....	3.19	....
Surplus	$952,152	$1,168,001	9.50	12.06

(a) The company charges off 10.40 cents per bus-mile for maintenance, including depreciation. Depreciation of tires is based on "bus-tire mileage" at the guaranteed cost per mile.

(b) Reserve fund for payment of injuries and damages accrued at rate of 1½ cents per bus-mile.

TABLE II—FIFTH AVENUE COACH COMPANY OPERATING AND FINANCIAL STATISTICS

	1920	1921	1922	1923
Total revenue	$4,353,920	$5,198,936	$5,489,111	$5,837,196
Rate of fare in cents	10	10	10	10
Bus-miles	8,796,195	9,683,500	9,683,500	10,019,805
Speed in miles per hour	7.95	8.15	8.21	8.17
Total revenue per bus-mile, in cents	49.50	56.56	56.69	58.25
Total operating deductions per bus-mile, in cents	40.20	44.68	44.63	45.56
Net earnings per bus-mile, in cents	9.30	11.88	12.06	12.69
Ratio, operating deductions to total revenue, per cent	81.2	79.0	78.8	78.3
Available for interest from each dollar of revenue, in cents	18.8	21.0	21.2	21.7

TABLE III—FIFTH AVENUE COACH COMPANY, MISCELLANEOUS STATISTICS

	1923	1922
Buses:		
Revenue	293	296
Non-revenue	68	74
Total	361	370
Revenue Bus-Hours:		
Active and idle	1,221,567	1,177,463
Private hire	2,926	2,633
Total	1,224,493	1,180,096
Revenue Bus-Miles:		
Active	9,840,557	9,472,327
Idle	166,745	199,735
Private hire	12,503	11,438
Total	10,019,805	9,683,500
Bus-miles per bus-hour	8.17	8.21
Passengers carried	55,974,110	52,840,135
Transfers collected	3,450,608	2,732,608
Employees:		
Drivers	451	434
Conductors	444	453
Others	611	520
Total	1,506	1,407
Total wages and salaries	$2,787,952	$2,616,894
Accidents:		
Persons killed	6	3
Serious injuries	15	19
Minor injuries	955	762

TABLE IV—MUNICIPAL BUS LINES—NEW YORK CITY DATA FROM DEPARTMENT OF PLANT AND STRUCTURES

(Number of passengers carried is based on estimates)

Route	Miles	Buses	Daily Passengers
Delancey and Spring Street	2.09	40	40,000
Avenue C—Desbrosses Street Ferry	2.41	12	15,000
Madison and Chambers Streets	2.17	38	50,000
86th Street	2.26	26	25,000
96th Street	1.97	20	18,000
79th Street	2.32	20	20,000
Pennsylvania and Grand Central Stations	2.36	*5	5,000
Jerome Avenue	7.42	15	15,000
Prospect Avenue	3.41	22	18,000
Fort Schuyler	4.07	8	6,000
	30.48	206	212,000

* Estimated.

TABLE V—NEW YORK CITY (MANHATTAN AND BRONX) STREET RAILWAY OPERATION

	New York Railways	New York & Harlem Railroad	Eighth Avenue Railroad	Ninth Avenue Railroad	Total or Average
Revenue passengers	175,577,130	29,859,051	23,540,476	9,991,964	238,968,621
Transfer passengers	3,669,408	2,107,008	0	20,767	5,797,183
Passenger revenue	$8,424,518	$1,492,953	$1,177,009	$498,177	$11,592,657
Rate of fare, cents	5.00	5.00	5.00	5.00	5.09
Receipts per revenue passenger, cents	4.80	5.00	5.00	4.99	4.85
Receipts per passenger, cents	4.70	4.68	5.00	4.97	4.73
Car-miles operated	11,990,169	2,763,141	2,879,558	1,474,080	19,106,948
Car-hours operated	1,799,478	383,787	382,896	212,145	2,778,306
Average car-miles per hour (a)	6.67	7.21	7.52	6.95	6.90
Receipts per car-mile, cents	77.5	53.9	40.9	33.8	60.6
Receipts per car-hour	$5.17	$3.89	$3.07	$2.34	$4.18
Operating ratio in per cent	88.3	85.5	102.0	102.0	96.8
Expenses per car-mile, cents	68.3	46.1	41.7	34.5	58.8
Expenses per car-hour	$4.56	$3.33	$3.13	$2.39	$4.05
Revenue passengers per car-mile	14.67	10.80	8.17	6.78	12.50
Active cars in daily service	492	[illegible]	62	31	665
Miles per car per annum (b)	24,350	37,300	46,400	47,600	28,800
Miles per car per day (b)	66.8	104	127	130	79
Average seats per car	43.5	40.8	32.0	36.0	40.6
Seat-miles per annum	521,491,731	111,181,756	92,145,856	53,066,880	777,886,223
Man-hours per 1,000 seat-miles	6.79	5.87	7.48	4.00	6.60
Investment (c):					
Total	$35,100,000	$3,695,499	$3,910,766	$2,373,571	$45,079,836
Per dollar of revenue	$4.16	$2.47	$3.32	$4.76	$3.89
Per 1,000 seat-miles	$67.40	$33.20	$42.50	$44.60	$58.00
Per 1,000 revenue passengers	$200.00	$127.00	$166.00	$237.00	$188.50
Taxes, per cent of passenger revenue	10.25	6.80	8.04	11.20	9.30

(a) Obtained by dividing the total car-miles by the total car-hours. (b) Obtained by dividing the total car-miles by the number of active cars in daily service. (c) Value determined by the New York Transit Commission as of June 30, 1921.

A Typical Municipal Bus in New York

ing 1923 about 60,000,000 passengers, more than 94 per cent of whom were revenue passengers. The average speed for the year 1923 was 8.17 m.p.h., which is about the same as for the two years preceding.

MUNICIPAL BUS ROUTES

The municipal bus routes are lines operated under the direction of the Department of Plant and Structures, City of New York. But little operating and practically no financial data relative to the operation of these buses are available. The routes of the buses are shown on the map, and a statement of the routes operated, together with their length, the number of buses operated, and an estimate of the number of passengers carried daily is given in Table IV. This information is based on data obtained from the Department of Plant and Structures, where the statement was made that if a bus did not return $40 per day it was withdrawn from service.

All of these municipal buses operate on a 5-cent fare. The present routing eliminates the transfer question. The buses are of the single-deck inclosed type. They have longitudinal seats accommodating about 20 passengers. Standing is permitted, while on the Fifth Avenue buses passengers are accepted only when seats are available.

The owners of the buses operated over the municipal routes are individuals who as a rule are also the operators of these buses for at least a part of the day. These operators are not obliged to file reports with any municipal or other board of the number of passengers carried by them or of their expenses, and there is consequently no public accounting for fares. Based on the meager information available and on observation, a liberal estimate of the business done by these municipal buses would be that they are carrying about 70,000,000 passengers annually. On this basis the annual gross receipts would be $3,500,000. Observations made indicate that the buses are making about 7.5 m.p.h. With the gross receipts assumed, this would make their receipts 38.8 cents per bus-mile. A fair estimate of their expenses would be 33.4 cents. This would give them an operating ratio of 86.1 per cent.

A Fifth Avenue Bus on Riverside Drive

TABLE VI—COMPARISON OF FIFTH AVENUE COACH AND MUNICIPAL BUS OPERATION, MANHATTAN AND BRONX

	Fifth Avenue Coach Company (a)	Municipal Buses (b)
Revenue passengers	55,974,110	70,000,000
Transfer passengers	3,669,408	0
Passenger revenue	$5,597,411	$3,500,000
Rate of fare, cents	10.00	5.00
Receipts per revenue passenger, cents	10.00	5.00
Receipts per passenger, cents	9.43	5.00
Miles operated	9,840,557	9,022,500
Hours operated	1,221,567	1,203,000
Average miles per hour	8.05	7.50
Receipts per bus-mile, cents	55.86	38.80
Receipts per bus-hour	$4.58	$2.91
Operating ratio in per cent	71.0	86.1
Expense per bus-mile, cents	39.71	33.40
Expense per bus-hour	$3.19	$2.50
Revenue passengers per bus-mile	5.69	7.76
Active buses in daily service	293	206
Miles per bus per annum	33,600	43,800
Miles per bus per day	66.8	120
Average seats per bus	48.5	24
Seat-miles per annum	477,000,000	218,000,000
Man-hours per 1,000 seat-miles	4.83	5.52
Investment:		
Total	$3,612,000	$2,500,000
Per 1,000 seat-miles	$7.60	$11.48
Per 1,000 revenue passengers carried	$64.80	$35.80
Per dollar of revenue	.65	.72
Taxes, per cent of passenger revenue	10.5	....

(a) Based on annual reports.
(b) All operating data are estimated.

COMPARATIVE STATISTICS

A summary of the operating and financial information for the municipal buses and Fifth Avenue Coach System is presented in Table VI. It shows that all the buses in Manhattan and the Bronx are carrying 125,000,000 revenue passengers annually and have receipts of $9,000,000. The passengers carried represent about 8 per cent of the total passengers carried in New York City.

Similar statistics for the street car companies operating in Manhattan and the Bronx, exclusive of the Third Avenue System and the Second Avenue Railroad are presented in Table V. These companies are omitted from this table for the reason that those shown serve more nearly the same territory as the buses. The salient operating and financial figures of the three are presented in comparative form in Table VII.

TABLE VII—SUMMARIZED COMPARISON OF DATA, NEW YORK SURFACE TRANSPORTATION SYSTEMS

	Fifth Avenue Coach Company	Municipal Buses	Surface Street Railways
Rate of fare, cents	10	5	5
Average miles per hour	8.05	7.50	6.90
Receipts per mile, cents	55.86	38.80	60.60
Operating expenses per car-mile, cents	39.71	33.40	58.80
Operating ratio	71.0	86.1	96.8
Taxes, per cent of revenue	10.5	....	9.3
Revenue passengers per mile	5.69	7.76	12.50
Seat-miles per revenue passenger	8.54	3.12	3.26
Investment per dollar of revenue	$0.65	$0.72	$3.89
Investment per 1,000 seat-miles	$7.60	$11.40	$58.00
Investment per 1,000 revenue passengers	$64.80	$35.80	$188.50

The cost of operations for the surface street railways is considerably higher than normal on account of depreciation charges, largely brought about through deferred maintenance. The municipal buses apparently have no overhead charges, are virtually tax free, and operate only where each bus is assured of at least $40 per day. The railways do not have these advantages.

In Manhattan the railways are required to use the underground conduit type of electric railway construction, which is by far the most expensive type of street railway construction. The unit investment of the railways is from three to six times that of the bus or coach. The railway is required to construct its own substantial roadway of steel and concrete, and to improve it with city paving. In the case of the bus and coach the roadbed and paving are furnished by the city at public expense. With the cost of this included under each of the other headings, the difference in investment will be not nearly as great.

Bonus System Reduces Accidents

Nashville Railway & Light Company Has 25 per Cent Fewer Accidents Since Adoption of Plan Whereby Trainmen Profit by Accident Reduction

A BONUS system for trainmen, inaugurated by the Nashville Railway & Light Company on Jan. 1, 1923, in connection with the safety work of the company, has resulted in a gratifying reduction in the number of accidents. The report for the first six months of 1924 shows a decrease in the number of accidents due to negligence on the part of the railway, from 319 to 245, approximately 25 per cent.

For the purposes of this work the company has divided the calendar year into three contest periods. The first and second of these are of four months each, but the last is a three-month period, ending Nov. 30, so that the bonus can be distributed to employees before Christmas. A fund of $1,500 is set up by the company as a base amount at the beginning of each contest. For every accident less than the number occurring during the same period the previous year $20 is added to this fund. If there are more accidents than during the corresponding period of the previous year, $20 is deducted from the fund for each such accident.

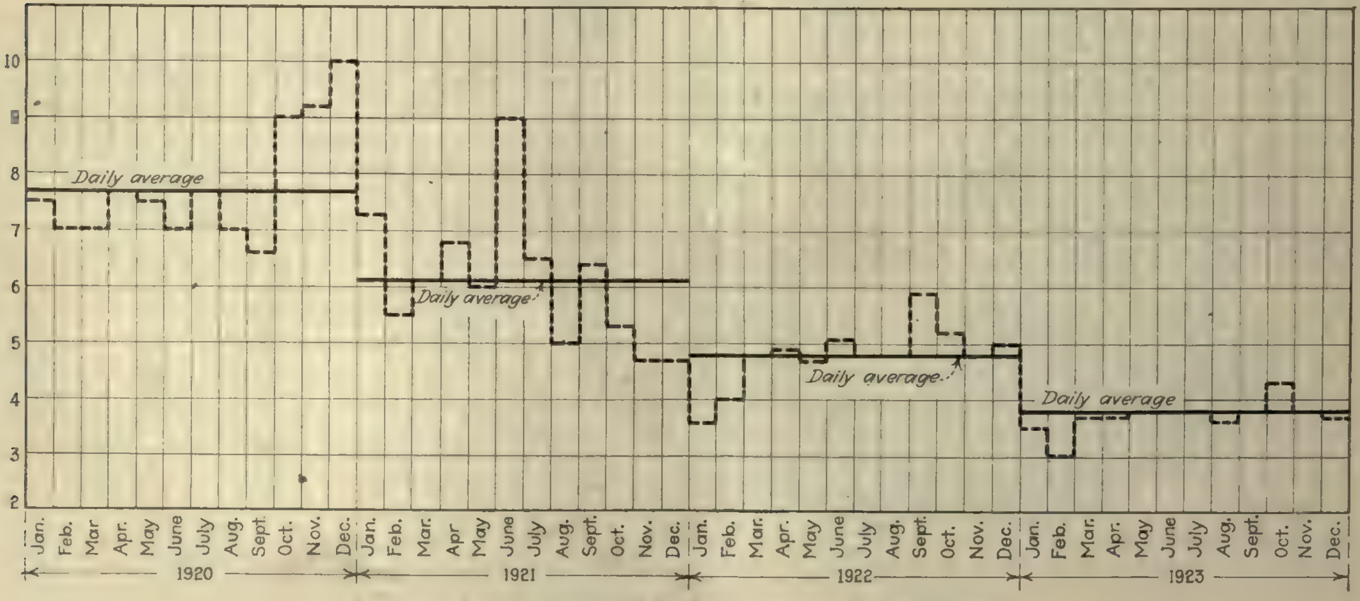
Trainmen participating in the contest are divided into two classes; first, motormen, operators and conductors who act as motormen most of the time; second, men who work only as conductors. Three-quarters of the bonus goes to trainmen in the first class, and one-quarter to those in the second class. No trainman is included in either class, however, unless he has worked as many as 750 hours during the four-month period. Conductors who have had one accident and motormen who have had three or more accidents do not participate in the bonus. Distribution is made in the proportion of 10:5:3 to those who have had none, one or two accidents during the four months.

Under the conditions of the contest certain classes of accidents must be reported but do not count against trainmen. These are collisions between automobiles or other vehicles near a street car, which are reported merely as a matter of protection to the company. Similar reports are made when the rear end of a car on straight track is run into by any vehicle, when passengers are sick on the cars, or when clothing is damaged by some defect. Any claim which may be filed and for which no report has been made by the crew is considered a blind claim, and counts double against the trainmen failing to make such a report. A double deduction is made in such a case from the bonus fund.

As a result of the inauguration of this system the average daily number of accidents was reduced from 4.8, in 1922, to 3.8 for 1923. This reduction has been made in spite of a constantly increasing number of automobiles registered in the county. Gratifying results continue to be obtained. The record for the month of June, 1924, and for the first six months of the year are shown in the following table:

	June, 1924	Year to Date
Total accidents	94	632
Car-miles operated	441,949	2,668,761
Car-miles per total accident	4,702	4,223
Chargeable accidents	39	216
Car-miles per chargeable accident	11,332	12,355

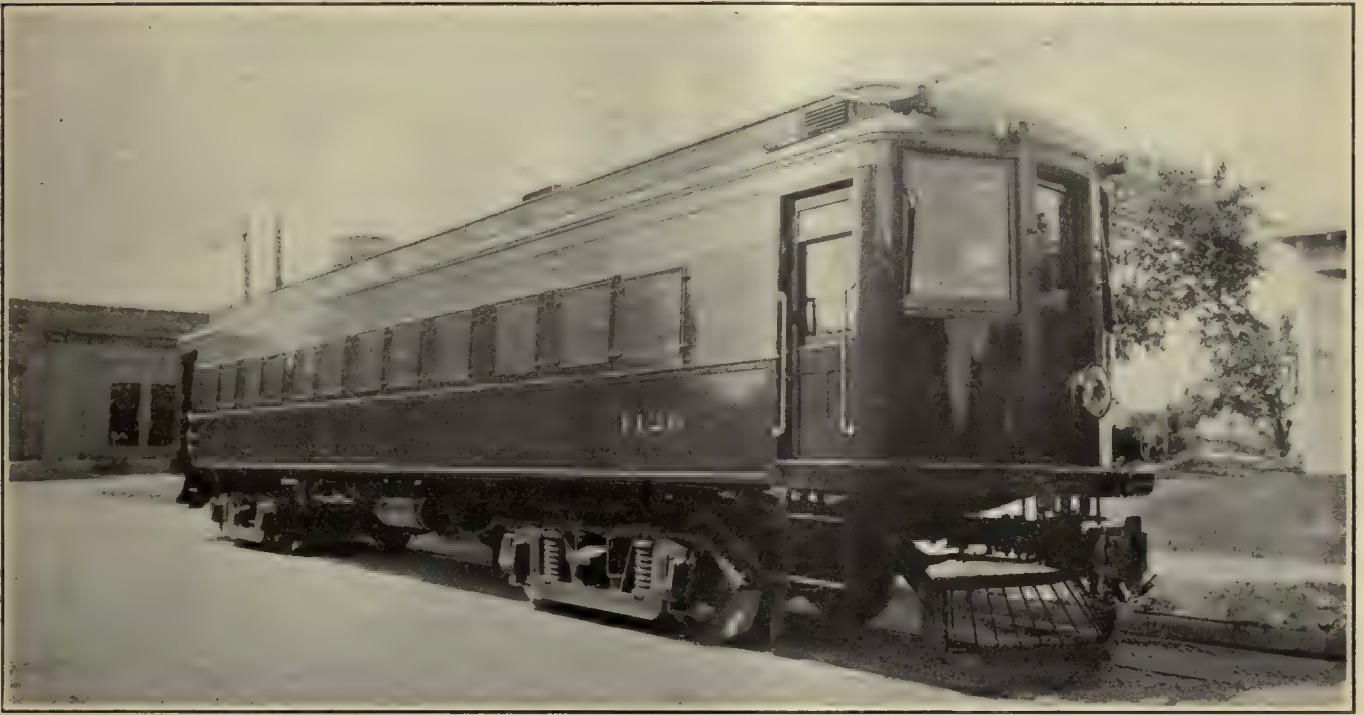
For the first six months of 1923 there were 683 accidents as against 632 this year. Of these only 245 were chargeable this year as compared with 319 last year.



Four-Year Accident Record of Nashville Railway & Light Company

Luxurious Cars for Interurban Service

Parlor Car and Coach Built by the Milwaukee Electric Railway & Light Company Have Many Features Typical of Steam Railroad Practice — Semi-Observation Front and Inclosed Observation Platform at the Rear Are Provided—Leather-Upholstered Deep-Cushioned Seats Are Used in the Coach



Attractive New Interurban Car of the Milwaukee Electric Railway & Light Company, Painted Pullman Green Below the Letterboard and Chrome Yellow Above

TWO cars recently completed at the Cold Spring shops of the Milwaukee Electric Railway & Light Company are the first of several of a new type of luxurious equipment which will be placed in service on the interurban lines of this company. Both cars are examples of modern car building, containing features which have not been incorporated heretofore in electric railway rolling stock. One is a parlor car having observation facilities at both ends. The other is a coach, with an interior finish as fine as that of the parlor car, and having deep-cushioned, non-reversible cross-seats with leather, upholstered backs, cushions and open-frame arms.

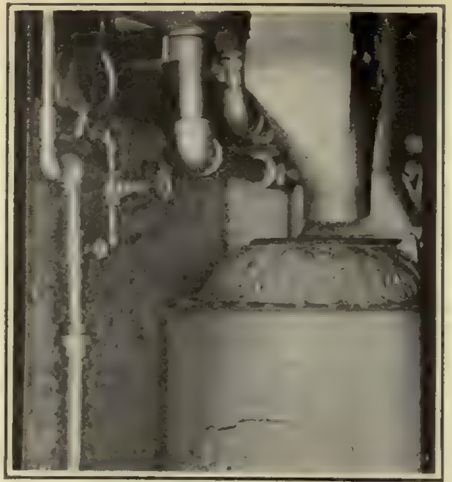
The parlor car has the same type of sub-frame as the standard interurban cars of this company. Baldwin electric motor passenger car trucks of 7-ft. wheelbase having triple elliptic springs, Westinghouse type 548-C-7 field control motors, and new Westinghouse schedule A.M.M. combined automatic and straight air-brake equipment are provided.

In this car a smoking compartment is separated from the main portion of the car by a small section which contains the toilet and a hot water heater. The arrangement of this apparatus and the utilization of every inch of available space for accessories are noteworthy. At one end of this dividing section is a partition extending almost across the car. At the other end a partition with a swinging door at the center separates it from the smoking compartment. These two partitions are approximately 5 ft. apart. A lavatory occupies the space adjacent to the main compartment partition, and a Peter Smith heater takes up the remaining space on the same side. The heater is inclosed by double doors with shutter strips. In the corner directly opposite the heater is a luggage rack.

By this method the smoking compartment is effectively separated from the rest of the car. The finish and appointments resemble those found in Pullman cars. Turned posts are used at the end of the dividing partition and at the corner of the luggage rack. The door to the lavatory has been placed at an angle, while the paneling adjacent to the door has been so placed as to create an effect similar to that of curved steel paneling in Pullman cars.

Appointments in the lavatory are of the latest design. The toilet is of the wet hopper type and a wash basin in the corner is of nickeled steel. Water for the toilet and wash bowl is stored in a tank which occupies space under the roof above the dividing section. The tank, which carries water sufficient for a day, is filled from the outside. The swinging door leading into the smoking compartment has a window of leaded glass worked into an artistic design. The luggage carrier consists of three shelves spaced with ample room for 12 suitcases of the ordinary size. Nickel-plated strips have been placed on the wall panels adjacent to the luggage rack in order to protect the finish.

With the Peter Smith heater located at the center



Coal for the Peter Smith Hot Water Heater Is Stored in a Bin Above the Heater. A Damper and Chute Provide a Means of Refueling the Stove. Ashes Are Dropped Through a Hole in the Floor of the Car Into a Pan Suspended Below

of the car, it was necessary to devise some means of getting coal into the heater and removing the ashes, without tracking up the car. To accomplish this, the space immediately above the heater compartment was made into a coal bin with a trapdoor in the roof by which to fill the bin. A chute which may be swung back out of the way connects this bin with the opening in the top of the stove. By means of a grate type damper, it is possible to shake out as much coal as is desired. The device was worked out in the shops and is made up of sheet iron of sufficient thickness to withstand the impact of pouring the coal.

Ashes are removed by opening a slide in the floor of the car directly below the grate of the heater. This opening in the floor is above a receptacle hung from the framework of the car, which contains a flat ashpan. With this arrangement, it is possible for the conductor to fire the heater and remove the ashes without soiling his hands or causing coal or ash dust to be spread throughout the car. The stove and all of its fittings in the heater compartment are painted with aluminum paint.

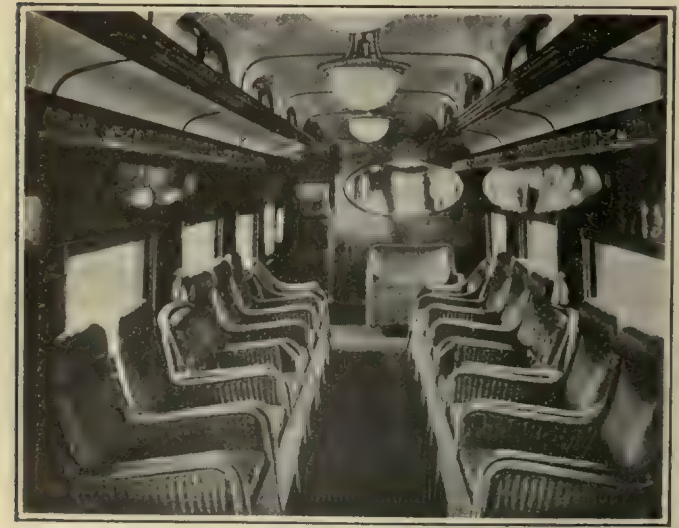
The roof is of the monitor deck type with an empire ceiling. Red mahogany finish and the white enameled ceiling with red mahogany paneling strips and ventilator sash give the interior a pleasing appearance. The hardware throughout has dull nickeled bronze finish. The carpet in the main section is the conventional Pullman design and green color. Twenty-four wicker chairs upholstered in brown leather line the two sides of the main compartment of the car. A small settee of the same construction with accommodations for two has been placed at the forward end of the compartment directly under the large oval mirror in the partition. The smoking compartment contains four of the same type of individual chairs and also two compartments, one on each side of the car, with leather-upholstered facing seats. A table has been mounted between each pair of seats, in order to provide facilities for card playing.

As the motorman's cab occupies only one side of the front end, it has been possible by including part of the front vestibule in the smoking compartment to obtain an observation front end. It is the custom for passengers in the smoking compartment to move the individual chairs into such a position that the view forward can be appreciated.

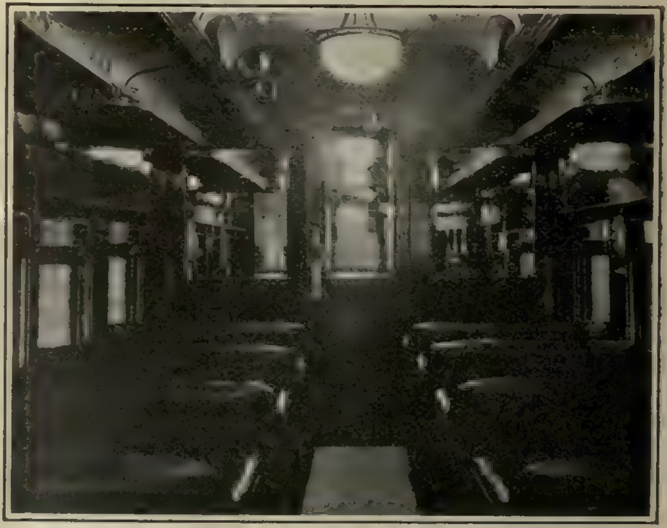
At the rear of the car, the platform has been partitioned off by means of long glass windows and a long glass paneled door. The step well has been inclosed by means of a trapdoor. Suitable folding chairs have been placed in this space, providing an inclosed observation platform, which is comfortable during all seasons of the year. This car is run as a single unit on the Watertown line of the company, a charge of 25 cents in excess of the regular fare being made.

COACH HAS UNIQUE FEATURES

In the coach, which was built upon the same type of sub-frame as the parlor car, the same interior finish is used as in the parlor car, but the separation between the smoking compartment and the rest of the car is accomplished by means of a glass paneled partition with swinging door. The vestibule at the forward end has been incorporated in the smoking compartment in a manner similar to that on the parlor car. The toilet and heater compartments have been located at the rear, however, the latter being on the rear platform. The outstanding feature of this car is the 23 heavily upholstered, deep-cushioned, non-reversible seats which have been spaced at an average of 39-in. centers opposite the windows on each side of the car. As will be seen in an accompanying illustration, the seats have upholstered open-frame arms at both the aisle and window ends. They were manufactured by the Hale & Kilburn Company and are completely covered with

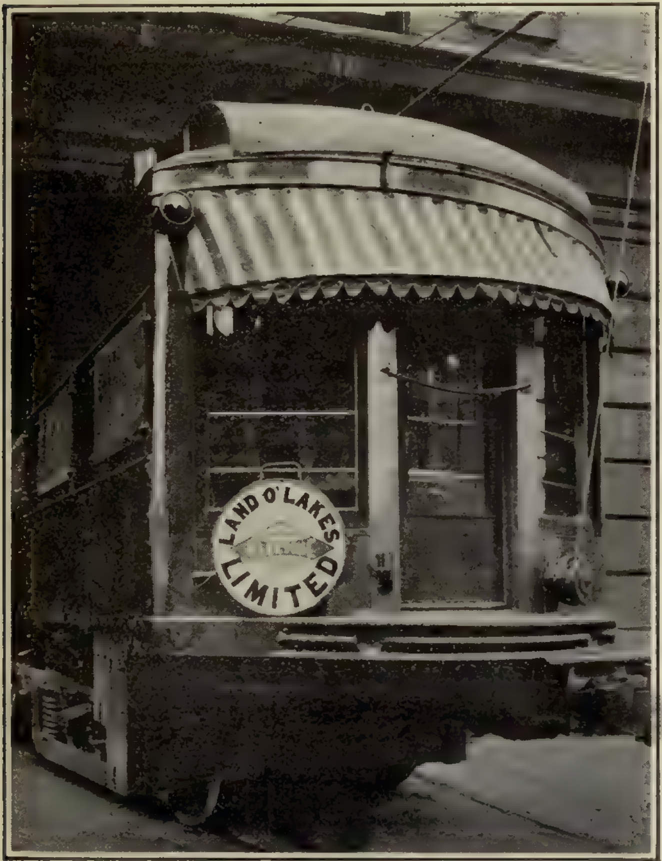


Wicker Chairs with Brown Leather Upholstering Are Used in the Main Compartment of the Parlor Car. The Interior Finish Is Highly Polished Red Mahogany



Heavily Upholstered, Low-Back, Deep-Cushioned Seats Are Used Throughout the De Luxe Coach. Beyond the Partition Is the Smoking Compartment dark brown "Zapon" leather. These seats have relatively low backs, but because of the heavy upholstering they are very comfortable. A rubber mat extends the full length of the car, being divided into two sections at the partition between the smoking compartment and the main section of the car. Parcel racks of dull nickeled bronze finish are made up in sections approximately 4 ft. long, and are mounted above the single sash window.

In this car as well as the parlor car, the upper sash has been eliminated, resulting in a wide letterboard on the outside and an imposing mahogany panel on the inside. As a substitute for the customary window guards on the outside, both of these cars have been provided with heavy copper screens. These are made in individual sections to fit each window, and are arranged so that they may be removed and replaced with storm sash during the winter months.



The Inclosed Rear Vestibule Provides an Observation Platform Sheltered from Wind and Rain

On each side of the bulkhead partition between the two compartments of the car has been mounted a 10-in. non-oscillating electric fan. The lighting fixtures in both cars consist of transparent bowl shades suspended by nickeled bronze fixtures. Each bowl contains a 200-watt, 50-volt lamp operating in series with four others connected to a low-voltage regulator which receives its energy from the trolley. This arrangement has done much to eliminate the fluctuations of light due to the irregularities of the trolley voltage.

Both of these cars have a striking exterior appearance. They are painted with Pullman green below the letterboard and chrome yellow above. Lettering is done in gold, edged with black. The under rigging and trucks of the cars have been painted green, while a bit of attractiveness has been added to these parts of the car by spray painting the wheels chrome yellow. Each car is provided with two trolley poles, although both are single end operated. Provision has been made for train operation, if it is found desirable, by placing receptacles for both the control and bus line jumpers at the ends of each car.

With these two cars in service and others in the process of construction at the shops, the company will be in position to furnish to its patrons over the interurban line de luxe service both at the normal rate of fare and at an excess fare. It is the intention of the company to offer to the traveling public accommodations as comfortable as those found in steam railroad practice.

Change Receptacle Facilitates Fare Collection

TO SPEED UP the fare collection on one-man cars, the Youngstown Municipal Railway has installed near the fare box a simple change receptacle. This has facilitated the work of the operator to such an extent that he is able to take care of two passengers in about the same time he formerly devoted to one.

The cash fare of 8 cents or a metal token is collected in a Cleveland fare box at the time the passenger leaves the car. When the operator is tendered a coin for making change, such as a dime or a quarter, he places the proper change in the change receptacle, from which it is removed by the passenger who deposits the fare in the box. By placing the change in the receptacle the operator does not have to wait until the passenger extends his hand, but may turn his attention to the next passenger.

When several passengers are leaving the car at the same stop, the operator places the change for the first passenger in the receptacle, while the change for the second passenger is given directly to him. By the time the first passenger has recovered his change from the receptacle, the second passenger has received his change from the operator. Thus both passengers have been served and are prepared to drop the proper token or cash into the fare box at approximately the same time. Following passengers are treated in the same manner, every other one receiving his change in the receptacle.

The receptacle is made from a block of wood and finished 4 in. in diameter and $1\frac{1}{2}$ in. thick, cupped out on its upper surface to a depth of $\frac{1}{2}$ in. It is fastened by means of a wood screw to a sheet-iron bracket, which in turn is fastened to the fare box stanchion, or, in the case of the recently rebuilt double-truck cars, to the braces which extend from the fare box stanchion to the inside of the platform dash.

This simple device is now being made standard equipment on all cars and buses operated by the Youngstown Municipal Railway. It was designed and made in the Hazelton car shop of the company.

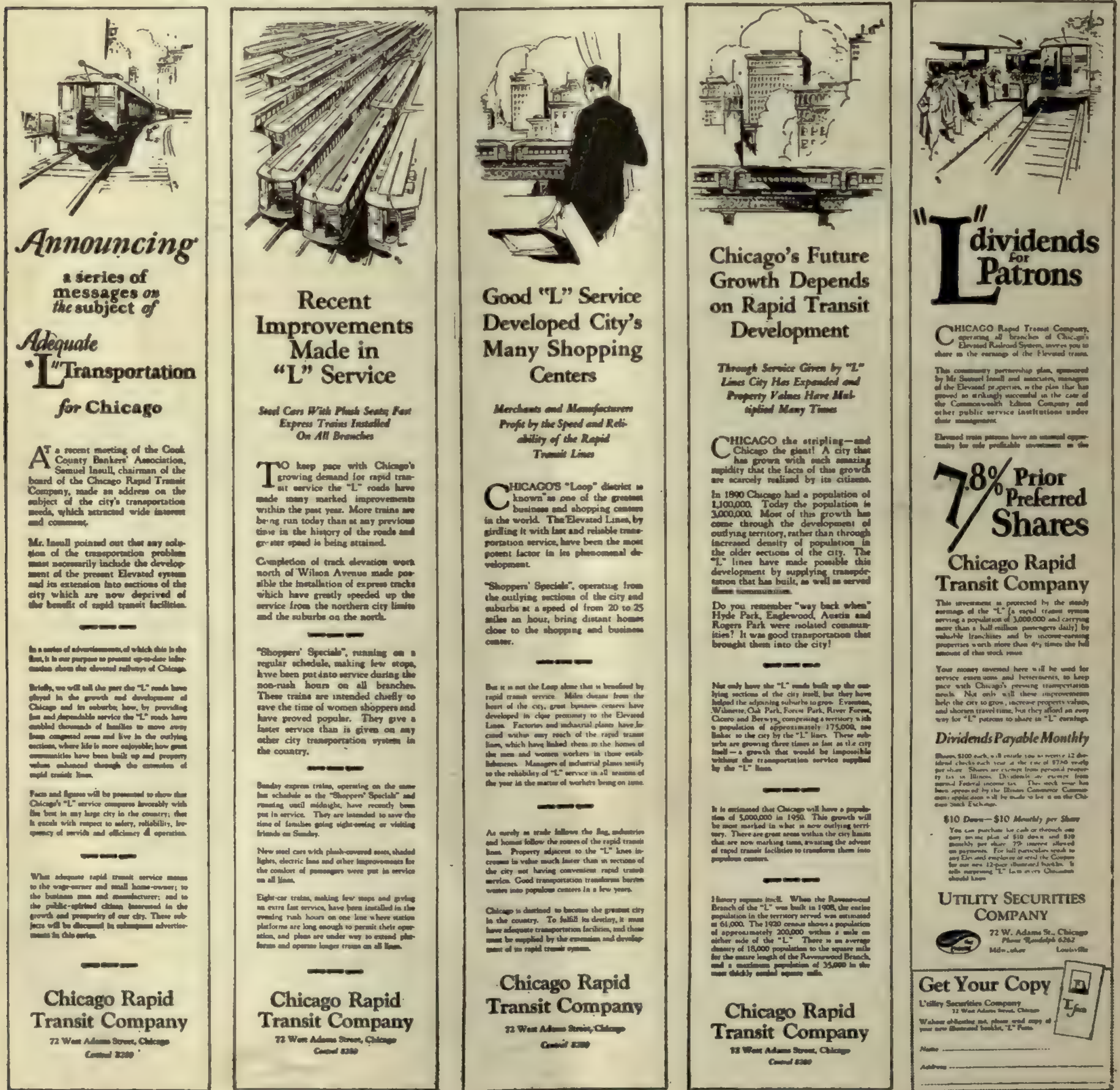
A thirty-six-page booklet containing a map of railway routes, terminals and bus lines has been prepared by the United Railways & Electric Company, Baltimore, Md., dedicated to the people of the city and vicinity. The pamphlet contains some information about the historic beginnings of the United, the car lines of today, employees, power repair shops, safety system and many other pertinent facts to show that the system is part and parcel of the life of the people.

Newspaper Advertisements Promote Sale of Stock

A SERIES of attractive advertisements has appeared recently in the daily papers of Chicago setting forth the development in service rendered by the Chicago Rapid Transit Company. These ads appeared first in conjunction with the good-will campaign inaugurated by the company a short time ago to serve as a forerunner of the sale of 7.8 per cent prior preferred stock.

The advertising campaign has been handled by a local advertising agency in Chicago, the ads being altered in the various daily papers so that one appeared in each paper on a different day before the next one was released. Typical examples of these advertisements are shown in the accompanying illustration. Each advertisement is two columns wide and extends the entire length of the page. At the top of every advertisement is a line cut showing some view characteristic of the elevated system, while immediately below this in graduated type is reading matter setting forth the achievements of the system or reasons for purchasing the preferred stock. The slug line between the various size type represents a three-car elevated train, while at the bottom the name "Chicago Rapid Transit Company" has been set in large type. Wherever possible they have been run near the edge of the page, as near the front of the newspaper as possible.

These advertisements have been sent out by the Utilities Securities Company, a stock selling company handling the work for the Chicago Rapid Transit Company. Gratifying success has marked the progress of this campaign up to the present time, as has been told in previous issues of this paper. After the completion of the campaign it is the intention of the company to continue using paid advertising space in the daily papers, as well as billboard advertisements, to set forth the advantages of rapid transit service to the people of Chicago.



Announcing a series of messages *on the* subject *of* *Adequate* "L" Transportation *for* Chicago

AT a recent meeting of the Cook County Bankers' Association, Samuel Insull, chairman of the board of the Chicago Rapid Transit Company, made an address on the subject of the city's transportation needs, which attracted wide interest and comment.

Mr. Insull pointed out that any solution of the transportation problem must necessarily include the development of the present Elevated system and its extension into sections of the city which are now deprived of the benefit of rapid transit facilities.

In a series of advertisements, of which this is the first, it is our purpose to present up-to-date information about the elevated railways of Chicago.

Briefly, we will tell the part the "L" roads have played in the growth and development of Chicago and its suburbs; how, by providing fast and dependable service the "L" roads have enabled thousands of families to move away from congested areas and live in the outlying sections, where life is more enjoyable; how great communities have been built up and property values enhanced through the extension of rapid transit lines.

Facts and figures will be presented to show that Chicago's "L" service compares favorably with the best in any large city in the country; that it excels with respect to safety, reliability, frequency of service and efficiency of operation.

What adequate rapid transit service means to the wage-earner and small home-owner; to the business man and manufacturer; and to the public-spirited citizen interested in the growth and prosperity of our city. These subjects will be discussed in subsequent advertisements in this series.

Chicago Rapid Transit Company
72 West Adams Street, Chicago
Central 8280

Recent Improvements Made in "L" Service

Steel Cars With Plush Seats; Fast Express Trains Installed On All Branches

TO keep pace with Chicago's growing demand for rapid transit service the "L" roads have made many marked improvements within the past year. More trains are being run today than at any previous time in the history of the roads and greater speed is being attained.

Completion of track elevation work north of Wilson Avenue made possible the installation of express tracks which have greatly speeded up the service from the northern city limits and the suburbs on the north.

"Shoppers' Specials", running on a regular schedule, making few stops, have been put into service during the non-rush hours on all branches. These trains are intended chiefly to save the time of women shoppers and have proved popular. They give a faster service than is given on any other city transportation system in the country.

Sunday express trains, operating on the same fast schedule as the "Shoppers' Specials" and running until midnight, have recently been put in service. They are intended to save the time of families going sight-seeing or visiting friends on Sunday.

New steel cars with plush-covered seats, shaded lights, electric fans and other improvements for the comfort of passengers were put in service on all lines.

Eight-car trains, making few stops and giving an extra fast service, have been installed in the evening rush hours on one line where station platforms are long enough to permit their operation, and plans are under way to extend platforms and operate longer trains on all lines.

Chicago Rapid Transit Company
72 West Adams Street, Chicago
Central 8280

Good "L" Service Developed City's Many Shopping Centers

Merchants and Manufacturers Profit by the Speed and Reliability of the Rapid Transit Lines

CHICAGO'S "Loop" district is known as one of the greatest business and shopping centers in the world. The Elevated Lines, by girdling it with fast and reliable transportation service, have been the most potent factor in its phenomenal development.

"Shoppers' Specials", operating from the outlying sections of the city and suburbs at a speed of from 20 to 25 miles an hour, bring distant homes close to the shopping and business center.

But it is not the Loop alone that is benefited by rapid transit service. Miles distant from the heart of the city, great business centers have developed in close proximity to the Elevated Lines. Factories and industrial plants have located within easy reach of the rapid transit lines, which have linked them to the homes of the men and women workers in those establishments. Managers of industrial plants testify to the reliability of "L" service in all seasons of the year in the matter of workers being on time.

As surely as trade follows the flag, industries and homes follow the routes of the rapid transit lines. Property adjacent to the "L" lines increases in value much faster than in sections of the city not having convenient rapid transit service. Good transportation transforms barren wastes into populous centers in a few years.

Chicago is destined to become the greatest city in the country. To fulfill its destiny, it must have adequate transportation facilities, and these must be supplied by the extension and development of its rapid transit system.

Chicago Rapid Transit Company
72 West Adams Street, Chicago
Central 8280

Chicago's Future Growth Depends on Rapid Transit Development

Through Service Given by "L" Lines City Has Expanded and Property Values Have Multiplied Many Times

CHICAGO the stripling—and Chicago the giant! A city that has grown with such amazing rapidity that the facts of this growth are scarcely realized by its citizens.

In 1890 Chicago had a population of 1,100,000. Today the population is 3,000,000. Most of this growth has come through the development of outlying territory, rather than through increased density of population in the older sections of the city. The "L" lines have made possible this development by supplying transportation that has built, as well as served these communities.

Do you remember "way back when" Hyde Park, Englewood, Austin and Rogers Park were isolated communities? It was good transportation that brought them into the city!

Not only have the "L" roads built up the outlying sections of the city itself, but they have helped the adjoining suburbs to grow. Evanston, Wilmette, Oak Park, Forest Park, River Forest, Cicero and Berwyn, comprising a territory with a population of approximately 175,000, are linked to the city by the "L" lines. These suburbs are growing three times as fast as the city itself—a growth that would be impossible without the transportation service supplied by the "L" lines.

It is estimated that Chicago will have a population of 5,000,000 in 1950. This growth will be most marked in what is now outlying territory. There are great areas within the city limits that are now marking time, awaiting the advent of rapid transit facilities to transform them into populous centers.

History repeats itself. When the Ravenswood Branch of the "L" was built in 1908, the entire population in the territory served was estimated at 61,000. The 1920 census shows a population of approximately 200,000 within a mile on either side of the "L". There is an average density of 18,000 population to the square mile for the entire length of the Ravenswood Branch, and a maximum population of 35,000 in the most thickly settled square mile.

Chicago Rapid Transit Company
72 West Adams Street, Chicago
Central 8280

"L" dividends for Patrons

CHICAGO Rapid Transit Company, operating all branches of Chicago's Elevated Railroad System, invites you to share in the earnings of the Elevated trains.

This community partnership plan, sponsored by Mr. Samuel Insull and associates, managers of the Elevated properties, is the plan that has proved so strikingly successful in the case of the Commonwealth Edison Company and other public service institutions under their management.

Elevated train patrons have an unusual opportunity for safe profitable investment in the

7.8% Prior Preferred Shares

Chicago Rapid Transit Company

This investment is protected by the steady earnings of the "L" (a rapid transit system serving a population of 3,000,000 and carrying more than a half million passengers daily) by valuable franchises and by income-earning properties worth more than 4½ times the full amount of this stock issue.

Your money invested here will be used for service extensions and betterments, to keep pace with Chicago's growing transportation needs. Not only will these improvements help the city to grow, increase property values, and shorten travel time, but they afford an easy way for "L" patrons to share in "L" earnings.

Dividends Payable Monthly

Shares, $100 each, will entitle you to receive 12 dividend checks each year at the rate of $7.80 yearly per share. Shares are exempt from personal property tax in Illinois. Dividends are exempt from normal Federal income tax. This stock issue has been approved by the Illinois Commerce Commission; application will be made to list it on the Chicago Stock Exchange.

$10 *Down*—$10 *Monthly per Share*

You can purchase for cash or through our easy saving plan of $10 down and $10 monthly per share. 7% interest allowed on payments. For full particulars speak to any Elevated employee or send the Coupon for our new 12-page illustrated booklet. It tells surprising "L" facts every Chicagoan should know.

UTILITY SECURITIES COMPANY
72 W. Adams St., Chicago
Phone Randolph 6262
Milwaukee Louisville

Get Your Copy

Utility Securities Company
72 West Adams Street, Chicago

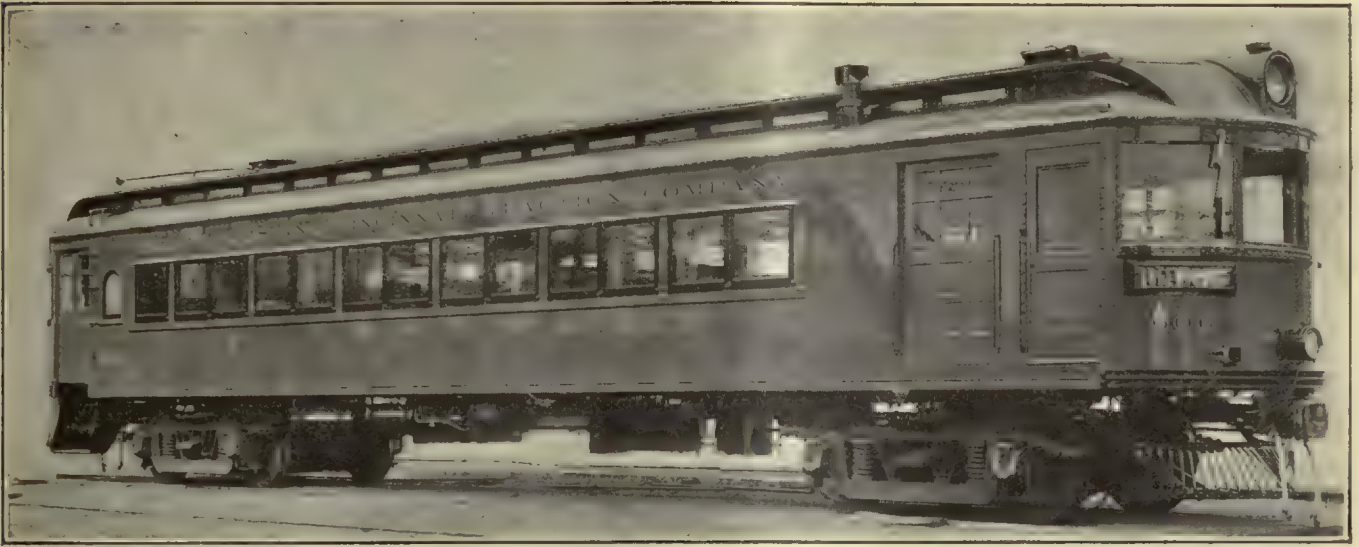
Without obligating me, please send copy of your new illustrated booklet, "L" Facts.

Name ....

Address ....

....

Typical Examples of Newspaper Advertising in Chicago Rapid Transit Company Stock Campaign



Twelve New Steel Passenger Cars of This Type Have Been Placed in Service. They Are Designed for Use Both in Local and Limited Service

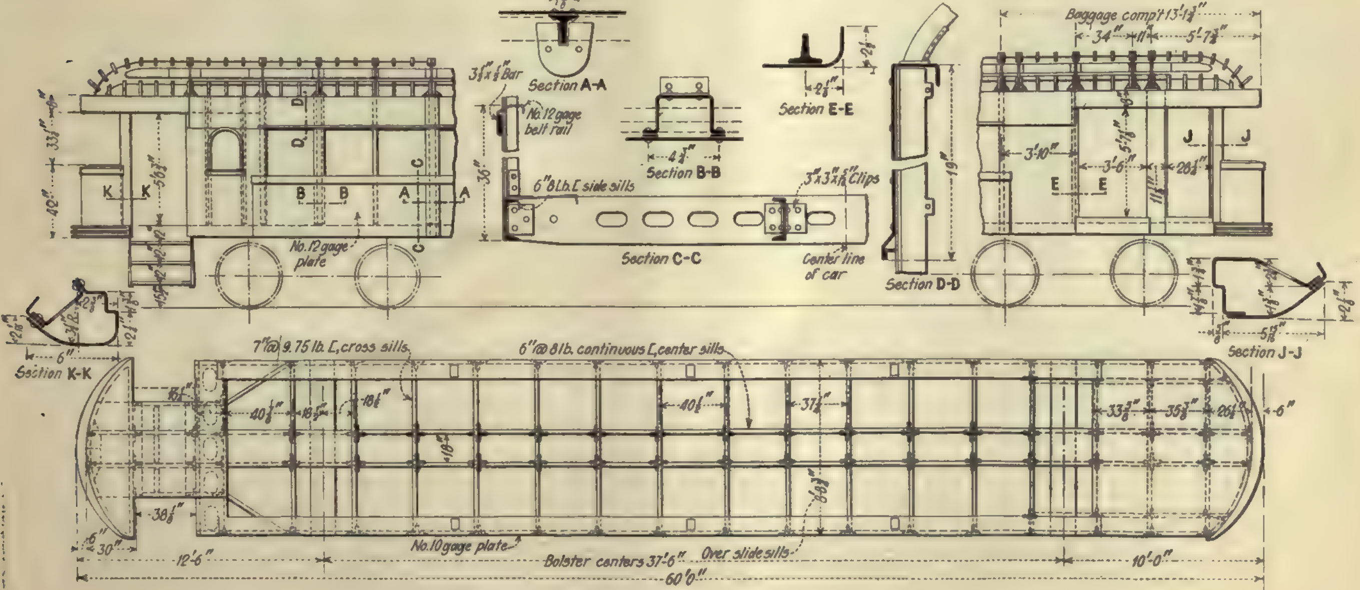
How the Indianapolis & Cincinnati Line Was Rehabilitated

Third Article

When This Road Was Rehabilitated It Was Entirely Re-equipped with Modern Light-Weight Passenger Cars—These Have Been Designed for Large Carrying Capacity and High Speed—The Freight Cars Also Have Been Modernized

THE Indianapolis & Cincinnati Traction Company, which recently has converted its entire system from the 3,300-volt single-phase system to 600 volts d.c., is an example of what can be accomplished in modernizing an existing property to obtain improved operating conditions. The general features of the new installation and the automatic substation equipment have already been described in ELECTRIC RAILWAY JOURNAL in two articles published in the issues of July 26, page 113, and August 2, page 163. This, the third and last article of the series, describes the new car equipment installed on the road.

Conforming in general arrangement to the standard interurban design which has been considered particularly suitable to the requirements on most of the lines in the central territory, the new cars of the I. & C. are provided with passenger, smoking and baggage-express compartments. Although built with all-steel framing construction, they are considerably lighter than the wooden cars which they replace.



Framing Details of the New Passenger Cars

Looking Toward the Rear in the Passenger Compartment. Plush Seats, Mahogany Finish and Carefully Arranged Lighting Assist in Providing Passenger Comfort

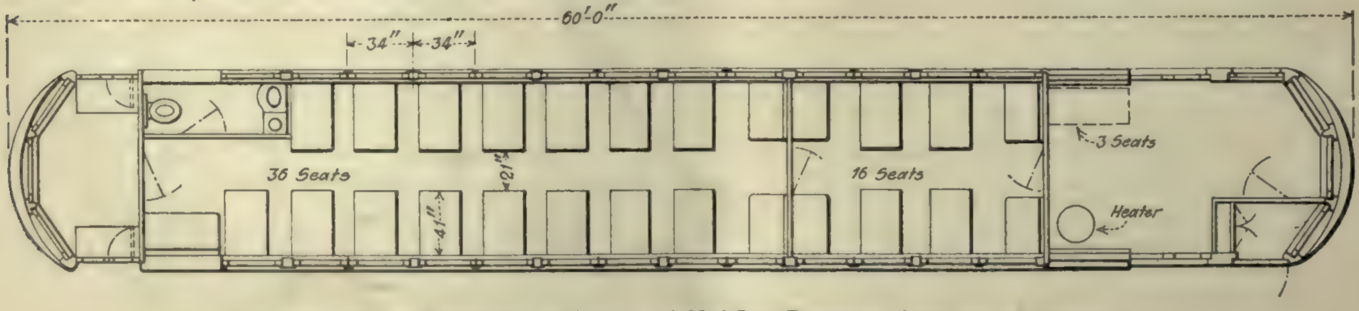
The Arrangement of the Motorman's Compartment in the Right-Hand Corner Gives Passengers a Clear View Ahead. The Water-Storage Tank Is Seen Above

Pleasing appearance and passenger comfort were two paramount objects in the design. Consequently, careful attention was given to lines, finish, trim and illumination. In addition, full-upholstered plush seats are spaced on liberal centers, the floors are covered with linoleum, liberal heating capacity is provided, and careful attention has been given to various details, such as sanitary water coolers, large wash room and toilet, and convenient racks for hand baggage. The requirements for obtaining easy riding of the cars were carefully studied by the truck manufacturer, and the Baldwin trucks which were finally developed give the new cars such improved riding qualities over the existing roadbed that an immediate favorable reaction was expressed by passengers.

An accompanying drawing shows the general arrangement of the floor plan. The cars are 60 ft. long over all and approximately 8 ft. 11 in. wide. The main compartment seats 36 passengers, the smoking compartment seats 16, and there is a folding seat in the baggage compartment with capacity for three additional passengers. The seats are spaced on 34-in. centers and are non-reversible. They are 41 in. wide, leaving an aisle width of 21 in. Those in the main passenger compartment are upholstered in Tuscan red plush, while brown Fabrikoid is used in the smoking compartment. The floor is made of two thicknesses of ⅞-in. yellow pine, one laid longitudinally and the other cross-wise of the body. The two layers are separated by building felt, and the entire floor is covered with ¼-in. linoleum.

At the front end of the car the motorman's compartment is placed in the right-hand corner. Plate glass is used in all of the front windows, that in front of

Length over all		60 ft. 0 in.
Height, rail to top of trolley board		12 ft. 10 in.
Entrance door opening, clear		2 ft. 6 in.
Height, rail to car floor		4 ft. 3½ in.
Baggage door opening		3 ft. 6 in.
End bulkhead door opening		2 ft. 9 in.
Partition door opening		2 ft. 0 in.
Seating capacity:		
Main compartment	36	
Smoking compartment	16	
Baggage compartment	3	
Total	—	55
Width of seats		3 ft. 5 in.
Width of aisle		1 ft. 9 in.
Truck centers		37 ft. 6 in.
Side post centers		2 ft. 10 in.
Total weight		82,000 lb.
Builder of body		Cincinnati Car Company
Headlining		Agasote
Interior trim		Mahogany-faced Haskelite
Type of roof		Monitor
Air compressor		Westinghouse DH-25
Bumpers		Hedley anti-climbers
Car signal system		Cord-operated air valve, conductor to motorman; cord-operated bell, motorman to conductor: Consolidated single-stroke bell signal for train operation.
Car trimmings		Dayton statuary bronze
Control		Westinghouse, HLF
Couplers		Tomlinson radial M. C. B.
Curtain fixtures		Curtain Supply ring 90
Curtain material		Double-faced Pantasote
Destination signs		Hunter illuminated
Gears and pinions		Nuttall helical
Hand brakes		Peacock
Heater equipment		Peter Smith OC-2
Headlights		Electric service—deck-HDB, 12 in.: city service, 9 in., T-96 portable
Journal boxes		Symington
Motors		Four Westinghouse 548-C-7, inside hung
Sanders		Ohio Brass
Sash fixtures and trapdoors		O. M. Edwards
Seats		Hale & Kilburn
Seating material		Plush in main passenger compartment, Fabrikoid in smoker
Step treads		Cincinnati Car
Trolley catchers		Knutson No. 5
Trolley base		Nuttall No. 13
Trolley shoes		Miller
Trucks		Baldwin
Ventilators		Nichols-Lintern deck fixture
Wheels		36-in. rolled steel
Power saving device		Economy meters



The New Cars for Passenger Service Are Divided Into Passenger, Smoking and Baggage Compartments. They Seat 55 Persons

the motorman being ½ in. thick to decrease frosting and at the same time provide increased safety when operating at high speeds. The glass lines in the partition between the various compartments are lined up so as to give passengers, even in the rear compartment, a view through the front windows.

STEEL FRAMING DESIGNED FOR HIGH SPEED

Substantial steel frame construction was adopted to provide the maximum of safety for high operating speeds. The 6-in. 8-lb. channel side sills are carried on a line from the rear corners of the body around the front end to form a backing for the front bumper. Two center sills of this same material extend continuously from the front to the rear bumper. The cross-sills are 7-in. 9.75-lb. channels and are spaced on centers varying from 33⅝ in. to 40⅞ in. Where they intersect the longitudinal center sills, they are punched out in the web, so that the longitudinal sills extend through continuously. The fastenings at these intersections are made of 3-in. x 3-in. x 5/16-in. angle brackets riveted in place. The first cross-sill at the front end of the body extends across between the ends of the bumper. Between this sill and the bumper a No. 12 gage steel plate, 26½ in. wide, is riveted in place to form additional reinforcement. The rear end framing is similarly reinforced. The rear platform step wells are formed by tying the body underframing together with two cross-channels covered with a No. 12 gage plate, 16¼ in. wide, and then supporting the rear bumper construction on the extensions of the center sills and supplementary channels spaced so as to give the proper opening for the step wells.

Built-up type box bolsters are spaced on 37-ft. 6-in. centers. Each consists of a 15-in. x ¾-in. top plate and a 10-in. x ⅞-in. bottom plate, fastened together by a 5/16-in. web plate and further reinforced with plates and angles to give a rigid box structure. The underframing is further reinforced by No. 10 gage steel plates riveted longitudinally to the top of the side sills and the ends of the cross-sills.

Livestock Transportation Constitutes a Considerable Share of the Company's Freight Business. This Type of Rebuilt Motor Car Has a Cabin at the Rear for the Accommodation of Farmers Taking Their Stock to Market

From the side sills to the belt rails, No. 12 gage plates, 36 in. wide, form the flat side sheathing. Alternate side posts are made of pressed box form, and the others are made of structural T section. The No. 12 gage steel letterboards are 19 in. deep, leaving side window openings 28¼ in. high. No top sash is used.

Vestibule and body corner posts are of steel box construction. Steel panel piers are carried up to the letterboard at the four corners of the car body, and at the rear end these are cut to form small arched windows.

The roof is of the monitor type and is supported on a combination of wood and steel carlines. This is further reinforced by steel headers in the baggage compartment, and by the bulkhead at the rear end of the body and the partition structure between compartments.

A large toilet is equipped with metal wash bowl, and a supply of water is assured by a large storage tank carried overhead in the baggage compartment. The interior of the body is finished with mahogany-faced Haskelite, which is natural color and rubbed to a dull finish. Absence of a top sash gives considerable space above the windows, which is utilized for the storage of parcels and hand luggage. Substantial racks are provided, and they are sloped up at an angle to prevent parcels from falling.

The Freight Motor Cars Have Four 145-Hp. Motors. It Is Expected the Improvement in Service Will Result in a Substantial Growth in Freight Business

Careful attention was given to the subject of interior illumination. The installation adopted was designed to give the interior of the car a cheerful appearance. High-grade railroad-type fixtures are used. These consist of five indirect dome lights in the main passenger compartment and two in the smoking section. Center lights with direct reflectors in the baggage compartment, and two lights in the front sign box, are wired in series with the center body lights so as to form two circuits of five lights each, arranged so that one of the sign box lights is in each circuit. Additional illumination is provided in the passenger compartments by angle bracket fixtures, carrying inclosed globe shades. All lamps are 56-watt mill type. The lights on the rear platform are arranged so as to illuminate the steps. Rear marker lamps are wired so that each is in a separate body circuit. For additional safety, the regular type of oil marker lamps is carried.

For the present the new cars will be used for both local and limited service. They are equipped with Westinghouse 548-C-7 box-frame motors, rated at 105 hp., 925 r.p.m. on 600 volts. These motors are arranged for field control, with helical gearing of 21:68 ratio.

The control is Westinghouse HLF multiple-unit equipment, and the air compressors are of the Westinghouse DH-25 type. These cars are all equipped with Miller trolley shoes.

Four freight motor cars have been equipped with Westinghouse 557-A-7 box-frame motors. These are rated at 145 hp., 1,000 r.p.m. on 600 volts. They are also arranged for field control and are geared 16:61. When the extension to Cincinnati is made, it is the intention to utilize the new passenger motor cars for local service entirely, and to equip new limited passenger cars for the Cincinnati run with the same motor equipment as that selected for the freight motor cars. In this way the entire system will be standardized on two motor equipments, one for local service and one for limited and freight service.

The present new passenger cars have a total weight of 82,000 lb. Of this amount, 14,000 lb. is in the steel body framing. Some of the principal dimensions and items of equipment are listed in the table on page 204.

Honor System of Fare Collection Speeds Passenger Movement

Beaver Valley Lines Have Abandoned Zone Checks on One-Man Cars and Depend Upon the Honesty of the Passengers to Prevent Over-Riding

By H. O. Allison

Commercial Manager Beaver Valley Traction Company

SINCE March 30, 1924, the issue of zone checks on the lines of the Beaver Valley Traction Company, New Brighton, Pa., has been dispensed with and passengers are permitted to pay fare to their destinations without being "tagged." Moreover, if the ride purchased requires transfer to another route the passenger is given a transfer, which does not, however, indicate the desination to which fare has been paid. The length of the ride taken after fare has been paid depends solely on the honesty of the patron. The elimination of zone checks has been influential in speeding up the service.

There are eight 5-cent zones on the property. In addition, one-zone, two-zone, three-zone, all-zone and school passes are sold. Beginning with the installation of the one-man cars, it was thought necessary to tag passengers in order to prevent over-riding. For that purpose a check was issued at the time fare was paid, showing by punch mark the zone in which the passenger boarded and the zone to which he was going. In theory the operator was supposed to examine the zone checks returned when the passengers alighted and in this way discover any one trying to over-ride.

All this has now been done away with. The present method of fare collection is very simple. A passenger when boarding, if in doubt about the rate of fare to the point where he desires to go, is informed by the operator, and the exact change is then deposited in the fare box. Regular riders know the amount to deposit and proceed immediately into the car. There is no use of zone checks, no pledge of honesty and no attempt by the operator to remember the passenger's face and the point to which fare was paid.

TIME OF PASSENGER INTERCHANGE, BEAVER VALLEY TRACTION COMPANY

	Average Seconds per Passenger			
Standard Birney Car	Boarding	Alighting	Boarding and Alighting	All Passenger Interchanges
With identification slips......	3.67	3.18	3.18	3.31
Without identification slips...	3.28	2.37	2.87	2.81
Converted double-truck one-man car				
With identification slips......	4.47	3.35	3.70	3.81
Without identification slips...	3.37	2.79	2.96	3.02
New double-truck one-man car				
With identification slips......	3.81	3.33	2.65	3.15
Without identification slips....	3.68	3.12	2.54	3.12

About 14,000,000 passengers are carried annually by the Beaver Valley lines. There are four transfer points. At one of these transfer can be made and a 20-cent ride taken free. At another a 10-cent transfer ride is possible. On another division, irrespective of transfers, a passenger might possibly board a car, pay a single 5-cent fare and ride through seven zones. Careful checks have been made of the passengers boarding and alighting by zones, however, and these have been compared with the fares paid. This investigation has shown that there is practically no dishonesty. A few fares are lost, of course, but the company believes that fewer are lost under this system than under the old check and hand collection system.

A traffic survey shows that 65 per cent of the rides sold on this railway are for one zone, 25 per cent for two zones and 10 per cent in three or more zones. This was an influential factor in bringing about the decision to abandon the check system. With 90 per cent of the riding in one or two zones, it seemed essential that the procedure of fare collection be simplified. Each zone is approximately 2 miles long. Under the old system the operator in collecting fares sometimes was brought into contact with the passenger three distinct times in less than 3 miles. Under the present system the only contact is when the fare is first paid. There is also a saving in the cost of zone checks and the time consumed to issue and collect them. A faster schedule is being maintained and is expected to save the company several thousand dollars a year. The time saved in passenger interchange is shown in the accompanying table.

Numerous expressions of opinion favorable to the change have been received by the railway. The riders seem to feel that they have been relieved of a considerable nuisance by the abandonment of the zone check system. Local newspapers have commented favorably on the innovation. The railway took advantage of the occasion to indulge in skillful publicity work, telling its patrons how it proposed to abandon the system of tagging them.

Railway revenue does not show any increase due to the change in method of fare collection. Some industrial depression has been experienced in this region since the new system was inaugurated, making the receipts approximately 5 per cent less than a year ago. A careful count made on three lines that formerly used the zone check and where the honor system is now in operation showed that receipts decreased approximately 6½ per cent as compared with the figures under the old method of collection. On two lines which operate in one 5-cent zone only and zone checks have never been used the decrease in revenue was 11 per cent. This appears to show conclusively that whatever decrease exists is due to the industrial depression.

Association News & Discussions

Substitution of Bus for Car Will Not Aid Traffic Movement

THE removal of tracks from the streets and the substitution of buses for the electric railways, a plan which has been suggested to increase the capacity of existing streets, would make congestion worse instead of relieving it. This was brought out by J. A. Miller, Jr., assistant editor ELECTRIC RAILWAY JOURNAL, in the discussion of a paper by Arthur S. Tuttle, read before the City Planning Division of the American Society of Civil Engineers. Other discussions of this paper appeared in ELECTRIC RAILWAY JOURNAL for May 31, 1924.

The assertion was made by Mr. Tuttle in his paper that the economic advantages of the surface car over the bus in street capacity used have been lost to a considerable extent in crowded sections of the city because of the reduction of speed. Experience in other cities where large numbers of buses have been operated, Mr. Miller said, does not confirm this assertion. On the contrary the superiority of the street car over the bus is most evident where congestion is the greatest.

In order to reduce the cost per passenger-mile of motor-bus operation to approximately that of electric railway operation, bus development in the United States has been confined largely to vehicles operated by one man. This places a restriction on the carrying capacity, which may vary from 30 up to 50 as a maximum. Under the same conditions of loading, a street car can carry from 100 to 150 passengers. It is evident, therefore, that there would have to be three to four times as many units on the street to carry all the traffic by bus. The resulting congestion would be much worse than the present condition.

Extensive investigation made by Mr. Miller over a period of years developed the fact that in congested districts, with buses and cars operating in active competition on the same streets, the bus was not more than 10 to 20 per cent faster than the car. This apparent superiority in speed resulted primarily from the fact that the bus was making no attempt to handle all the traffic, but was simply providing a sort of express service for the limited numbers of persons whom it would accommodate. Time was saved because the buses received capacity loads at or near the beginning of the route and proceeded without making additional stops. From this it is clear that the greater speed of the bus is the direct result of its smaller carrying capacity.

The slight superiority in speed, however, is not enough to offset the 200 to 300 per cent increase in the number of units which would be required if buses were to carry the entire traffic. Although the use of double-deck buses would reduce somewhat the number of units needed, their greater carrying capacity would increase the number of stops required, and this, coupled with the delays incident to passengers climbing upstairs and downstairs, would reduce their speed to a rate somewhat slower than that of the street car. It appears, therefore, that the theory of lessening traffic congestion by the substitution of buses for street cars is not sound. Moreover, mass transportation by bus is unquestionably more expensive than by rail.

In the earlier discussion, it was stated that wheel traffic in New York City is gradually absorbing that formerly carried by rail, because more people are riding in motors and fewer on street cars and in subways. Statistics do not bear out this contention, Mr. Miller said. The figures of the Transit Commission, given in the accompanying table, show more passengers being carried by the railways in New York every year, the number in 1923 being approximately 14 per cent greater than in 1920.

REVENUE PASSENGERS CARRIED IN NEW YORK, N. Y.

Year	Surface Lines	Rapid Transit Lines	Total
1920	941,420,788	1,331,915,745	2,273,336,533
1921	977,652,062	1,418,649,471	2,396,301,533
1922	1,052,968,891	1,438,239,919	2,491,208,810
1923	1,071,736,876	1,506,076,001	2,577,812,877

It is very easy to say that all rail traffic should go underground. However, in view of the constantly increasing traffic on all the railways, how can sufficient subways be built quickly enough to permit the removal of surface and elevated lines? No one has yet been able to suggest a method.

As neither the substitution of buses nor the building of more subways is a feasible method of handling the passengers now carried on the surface, railway tracks must remain in the streets. It would be possible, however, to increase the capacity of existing streets by speeding up the movement of traffic. The present low speed of surface cars, which is used as an argument against them, is to a considerable extent the result of conditions that can be remedied. If traffic were regulated so that the tracks were kept clear for the cars and not obstructed by motor and horse-drawn vehicles of every description, and if traffic officers were encouraged to make a greater effort to co-ordinate their signals with the movement of cars, a substantial increase in speed for all traffic would be possible with no expense to any one.

It would be very unfortunate, Mr. Miller concluded, if the public became imbued with the idea of tearing up the car tracks in New York before an adequate substitute has been found to handle the tremendous traffic. Although such a step may not actually be contemplated, the frequent talk to this effect, whatever its purpose, is creating a feeling of doubt and uncertainty in the public mind which is working a great hardship on railways and seriously interfering with their program of reconstruction and improvement.

The Development of the Street Car

At a Meeting Held in St. Louis Members of the Birney Club Hear About Early Car Builders

THE present street car shows some traces of its development from the omnibus in the concave side panel used on many urban cars, according to a talk by W. H. Mackle of the American Car Company, given at a meeting of the Birney Club, at St. Louis, May 26. The first car for a city passenger service was built in New York in 1831 by John Stephenson for the New York & Harlem Railroad and was very similar in general appearance to a bus with the driver's seat on top. As late as 1850, street cars with these elevated seats were in use. Mr. Mackle also gave particulars of the street car building industry. A brief summary of this portion of his paper follows:

The work of John Stephenson has been mentioned. In the early '60s a company engaged in the building of passenger steam cars and horse cars in Philadelphia was that of Murphy & Allison, but in 1868 the plant was destroyed by fire and the building of horse cars was given up. J. G. Brill and his son, G. Martin Brill, had been connected with the company, and when the decision was reached to give up the construction of horse cars, they decided to start a plant of their own, which they did the following year. J. G. Brill was a genius in devising useful improvements in woodworking machinery that not only lessened labor but produced more accurate work. G. Martin Brill was an executive of high rank. Later, a younger brother, John A. Brill, entered the business with many creative ideas, which later materialized in truck construction and furnished the foundation of all the street car trucks that followed. His power of business vision in being able to interpret the shadows forecast by the coming of further developments in the car industry also rendered him of great service to the company.

In 1858 Andrew Wight, who had been employed at the John Stephenson works in New York, started a shop in St. Louis to repaint and repair omnibuses and later to build them. In 1867 he produced his first street car, and in 1879, on the death of Mr. Wight, Frederick D. Brownell became president of the company. While the product of these works was excellent, Mr. Brownell did little to advance the design of cars except to build the "Accelerator" car, which was short-lived. In 1883 the Laclede Car Company of St. Louis was organized in St. Louis by William Sutton, previously of the Brownell Car Company, and in 1887 the American Car Company was also organized in St. Louis by Mr. Sutton and others. In 1902 the American Car Company became a subsidiary of the J. G. Brill Company. In 1885 the St. Louis Car Company was organized by P. M. Kling, who had previously been superintendent of the Brownell Car Company.

Receiving and Disposing of Claims*

By J. H. Handlon

Claim Agent Market Street Railway

Some claim agents, in questioning claimants who call at the offices, are quite satisfied with receiving beforehand a brief synopsis of the claimant's version of the accident, alleged injuries, alleged losses and expectations, together with comments as to the individuality of the claimant. While this makes it convenient for the agent to review the claim at a glance, such a slipshod practice has a bad effect upon the investigator assigned to gather the facts, because he is then disposed to digest too briefly what he learns from the witnesses.

There are claim agents who adhere strictly to their rule requiring all claimants who call at their offices to prepare statements in their own handwriting, telling their version of the accident, injuries etc. There is some merit in such a plan, although it has its defects. For instance, claimants are not always in a pleasant frame of mind when they call at the office. In our community, many claimants would immediately turn on their heels and hurry to the office of an attorney if they were asked to write down the facts of their claims. Again, claimants may be illiterate, or unfamiliar with the exact location of the accident, directions, etc.

A much better plan is to have the person who talks to the claimant prepare for the claimant's signature a statement in which are embodied all of the details of the accident. The exact words of the claimant should be quoted as much as possible. Needless to say, the injuries and losses as stated by the claimants and the expectations of the claimants should also be noted and then the claimant requested to write on the statement, in his own handwriting, the words "I have read the above statement and I find the same to be correct." Care should be taken to see that the claimant affixes his signature to each page of his statements and, if possible, the signatures of witnesses should also be secured.

As for those who telephone with a view of presenting claims, it would appear advisable to induce them, if possible, to call at the office, for there are usually facilities at the claims department, not provided elsewhere, for taking statements, and there is less likelihood of interference from relatives or neighbors. If the claimants object to this or they are unable to call, for some reason or other, then it would appear advisable to call upon them. They can then be given printed requests to call for examination by the company's examining surgeon and directed where to submit their damaged wearing apparel or other property to the company's appraisers for inspection and report.

Should the claim be presented in writing for damage to property and no attorney be involved, it is advisable that the letter replying to their communication contain a request that they call at the office, bringing with them the names and addresses of their witnesses. If an attorney writes relative to a claim, far better results are obtained when the company representative calls upon him in acknowledgment of his letter and arrangements are made through him, if possible, to interview the claimants and their witnesses. Attorneys as a rule dislike the annoyance of being compelled to handle the details of a claim, and therefore the representative of the claims department can relieve the attorney of this annoyance by arranging for the injured persons to call at the medical department or assisting them to prepare their statement of losses and expenses, securing the original bills, etc.

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*Abstract of a paper presented at the annual convention of the Pacific Claim Agents' Association, Spokane, Wash., July 23-25, 1924.

Safety Congress at Louisville

The entire program for the 1924 meeting of the National Safety Council, at Louisville, Ky., Sept. 29 to Oct. 3, has not yet been completed, but that for the Electric Railway Section and for the joint meetings of that section and the Public Utilities Section has been announced. At the first session of the Electric Railway Section, on Tuesday morning, Sept. 30, a paper on "Overcoming the Hazards of Motor Bus Operation" will be delivered by R. N. Graham, manager of railways Pennsylvania-Ohio Electric Company, Youngstown, Ohio. This paper will be discussed by G. R. Radley, safety engineer the Milwaukee Electric Railway & Light Company, and by G. B. Powell, secretary Kentucky Carriers, Inc., Louisville. At the same session J. C. Carpenter, general manager Texas Power & Light Company, Dallas, will read a paper on "Why We Are Interested in Safety."

At the second session on Thursday morning, Oct. 2, R. R. Hadsell, general superintendent of transportation New York State Railways, Rochester, will present the report of the committee on award systems. "Interesting School Children in Safety on the Streets" will be the subject of a paper by Isaiah Gordon, Bureau of Safety, Chicago.

At the joint meeting of the Public Utilities Section and the Electric Railway Section to be held on Wednesday, Oct. 1, the place of the electric railway in community safety extension will be told by L. H. Palmer, vice-president and general manager United Railways & Electric Company, Baltimore. Homer Niesz, manager of industrial relations Commonwealth Edison Company, Chicago, will present a paper on "Instruction and Observance of Safety Rules in Station and Substation Operations." The highway traffic problem will be the subject of a paper by R. O. Mason, superintendent of transportation Philadelphia Electric Company.

Conference on Street and Highway Safety

Several meetings of committees on the Conference on Street and Highway Safety have been held during the past few weeks and several are scheduled during this month. The organization of the conference, of which Col. E. B. Barber is director and Ernest Greenwood is secretary, includes eight committees, as follows:

Committee on statistics, with W. M. Steuart, director Bureau of Census, as chairman. This committee has appointed a sub-committee on survey of available accident statistics and one on standardization of accident reporting forms and procedure. Two questionnaires have been distributed; one on legislation on accident reporting and the other on traffic accidents.

Committee on traffic control, of which Roy S. Britton, president Automobile Club of Missouri, is chairman. This committee has appointed four subcommittees, as follows: Licensing of drivers, city traffic, rural traffic, legislation.

Committee on engineering and construction, of which Frank Page, chairman North Carolina State Highway Commission, is chairman.

Committee on city planning and zoning, of which F. A. Delano, formerly vice-governor Federal Reserve Board, is chairman. Sub-committees have been appointed on: Decentralization and zoning, other city planning measures for relief of congestion and traffic hazards.

Committee on insurance, of which S. S. Huebner, University of Pennsylvania, Philadelphia, is chairman. Subcommittees have been appointed on: Causes and location of accidents, liability legislation, certification of titles and theft prevention, rating, safety promotion activities of insurance carriers.

Committee on education, of which J. W. Whitney, National Bureau of

Casualty and Surety Underwriters, New York, is chairman. Sub-committees of this committee are on: Education in the schools, special training, education of the public.

Committee on motor vehicles, of which C. F. Kettering, General Motors Research Corporation, Dayton, Ohio, is chairman.

Public relations committee, of which George M. Graham, Chandler Motor Company, Cleveland, Ohio, is chairman.

Future of Traction Securities*

By F. R. Coates

Henry L. Doherty Company, New York City

TEN or fifteen years ago the securities of electric railways were held in high regard by the investing public. Then came the World War with its period of inflated prices, during which the industry suffered severely, due principally to its inability to adjust rates of fare to meet the rising costs of operation and increased taxes. To add to their difficulties, the electric railways were threatened at that time with an unregulated competitor, the jitney bus. The credit of the traction companies became impaired and their securities—once looked upon as excellent investments—were shunned by the investment banker and the general public.

The present improved condition of the traction industry is real and permanent. One of the most important factors contributing to its recovery has been the breaking down of the 5-cent fare barrier. The average rate of fare today is 7.4 cents. We are not so much concerned, however, with the exact average rate of fare. The significant thing is that there has been a recognition on the part of the public and the duly constituted regulatory authorities that any flat rate of fare is an economic error. The public has become educated to the fact that only by permitting the electric railways to earn sufficient to meet all expenses and to pay a fair return on its invested capital can these utilities give the service desired and expand their facilities to meet the constantly increasing transportation requirements. Another contributing factor is the realization by the public that destructive unregulated competition is unsound and inevitably results in a condition detrimental to the public interest and welfare.

The improved condition of the traction industry is reflected in its operating statistics. Operating revenues of electric railways, according to figures published by the American Electric Railway Association, have increased 47 per cent since 1917 and are now close to $1,000,000,000 annually. The operating ratio, which rose from 65 per cent in 1917 to 80 per cent in 1920, has fallen to 74.1 per cent. Last year nearly 16,000,000,000 passengers were carried on electric railways in ths country—the greatest number carred in the history of the industry.

Another indication of the improved condition of the industry is found in an examination of the receiverships during the past six years. The maximum number occurred in 1919, when 48 companies, comprising 3,781 miles of track, went into receivership. By the end of 1923 the number of companies going into receivership had fallen to 12 with a total mileage of 333. In 1924 several companies, including one of the larger properties, emerged from receivership, making a further substantial decline.

Another encouraging feature is found in a statement recently issued by the American Electric Railway Association regarding the number of companies that have been wholly or partly relieved from unjust expense of maintaining pavement that is not used and not destroyed by them. There have been forty-six cases where street railways have been relieved from their paving burdens and, in addition, two states, Connecticut and Massachusetts, have enacted state-wide relief. In most of these cases the relief has been permanent, affording savings of many millions of dollars to the street railways and to the car riders.

There is no other transportation medium in existence that can perform the services being performed by the electric railways of this country. Electric railways, however, recognize the peculiar advantages of the motor bus as a supplement to rail service and are making use of this medium to an increasing extent. Today there are approximately 150 electric railways operating more than 1,600 motor buses in various kinds of service. Buses are valuable as feeders to the rail lines and for developing new territory until the traffic warrants rail lines. Buses also can be used in de luxe express and tourist service. Their operation, however, can be more efficiently conducted by experienced transportation agencies such as the traction companies. Furthermore, the best interest of the public will be served when the two forms of transport are properly co-ordinated in a single system under one reliable management.

There are also those who profess to see a decreasing demand for public transportation as a result of the increasing growth in the ownership of private automobiles. The answer to those people is that statistics show that although automobile registrations increased from 5,101,000 in 1917 to 12,880,000 in 1923, the passengers carried on electric railways increased during the same perid, from 14,506,000,000 to 15,989,000,000. And if we add to the passengers carried on electric railways, those carried on buses, the constantly increasing demand for public transportation is even more pronounced. Furthermore, there is reason to believe that competition from the privately-owned automobile has nearly reached its peak.

Other signs of more prosperous times and of a re-establishment of the confidence of investors in electric railway securities, are evidenced by the issuance of more than $48,000,000 of traction securities in the first six months of this year. Last year electric railways in this country were purchasers of such materials and equipment to the extent of $282,000,000. This year, nearly $100,000,000 have been expended alone for new track construction or reconstruction. Through intensive public relations activities, publicity and advertising, electric railways are now merchandising transportation. Electric railways have made greater progress in the last five years in the development of good public relations than they ever had during the previous thirty years of their existence.

The American Electric Railway Association now maintains an advertising section which co-operates with individual companies, state committees on public utility information, newspapers, magazines and other publicity and advertising channels. This department has access to all facts and figures in the possession of the association and is authorized to make them public. Every effort is being made to tell the whole story of the electric railway situation to the public hiding nothing.

The motor bus gives the electric railways a new tool, adding flexibility to existing facilities. No longer will it be necessary for an electric railway to make a heavy investment in track and overhead lines into a newly-developed territory where the amount of traffic may not justify such facilities for a number of years. The motor bus can be used for such extensions. Furthermore, the motor bus may be utilized to reduce deficits on lines operating in sparsely-settled sections of the community which never have built up sufficiently to justify the rail lines installed years ago.

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*Abstract of paper presented at the eleventh annual business conference of the Babson Organization, Babson Park, Mass., Aug. 8, 1924.

American Association News

Posters on Traffic Delays

THE committee on manufacturers' co-operation and the advertising section of the American Association have prepared a series of traffic posters designed to show some of the most important causes for traffic delay, such as slowly moving trucks on the track, parked cars, etc. These posters are printed in colors and are intended particularly for use by manufacturer companies of the association. They will be supplied free of charge on application to association headquarters.

Engineering Manual Is Now Ready

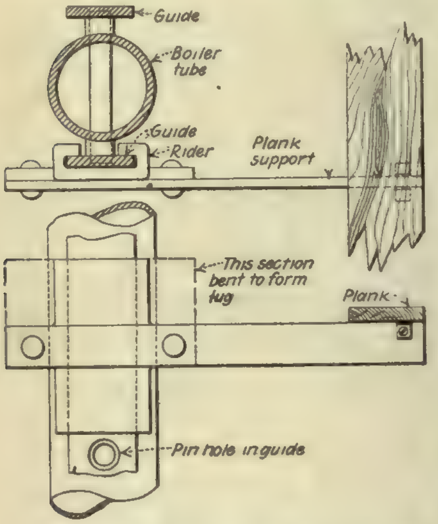
ANNOUNCEMENT is made at the American Electric Railway Association headquarters that the new edition of the Engineering Manual is now ready for distribution. The Manual is issued in book form and is available both to members and non-members. The new arrangement was described quite fully in the issue of the ELECTRIC RAILWAY JOURNAL for May 3, 1924, page 705. In that article was also given a schedule of prices, both for the bound volume and general sections.

Maintenance of Equipment

Adjustable Scaffolding for Car Body Work

REPAIR and painting work on car bodies at the Decatur shops of the Illinois Traction System is greatly simplified by the use of adjustable scaffolding. The vertical supports for the scaffolding are made of 3½-in. boiler tubes, which are embedded in the concrete floor to a depth of 3 ft., and have a height of 8 ft. above the floor. The supports are spaced 12 ft. apart along the line of the track, being placed so that the edge of the plank forming the scaffold is approximately 18 in. from the side of the car.

On each side of the boiler tube is riveted a 2-in. x ½-in. steel guide spaced ⅜ in. from the tube by means of ⅜-in. spacers through which pass five countersunk flat-head rivets which hold the guide to the tube. The rider on this guide is made up from a piece of ⅜-in. steel, 6 in. square. This is so cut at the corners that four lugs may be formed which are bent so as to grip the guide rail but at the same time permit the rider to slide freely. To this rider is riveted a piece of ½-in. x 2½-in. steel which serves as the support for the planking. At the end of this support is a small angle to which the planking is fastened.



A Rider Made from a piece of ⅜-In. Steel Travels on a Guide Riveted to the Boiler Tube Supports

This Scaffolding, Used in the Shops of the Illinois Traction System, Is Adjustable for Height and Facilitates Work in the Construction and Paint Departments

Holes have been drilled in the guides at various points so that a removable pin may be inserted below the rider to hold the scaffolding at the proper height for convenient working on the side, windows and roof of the car.

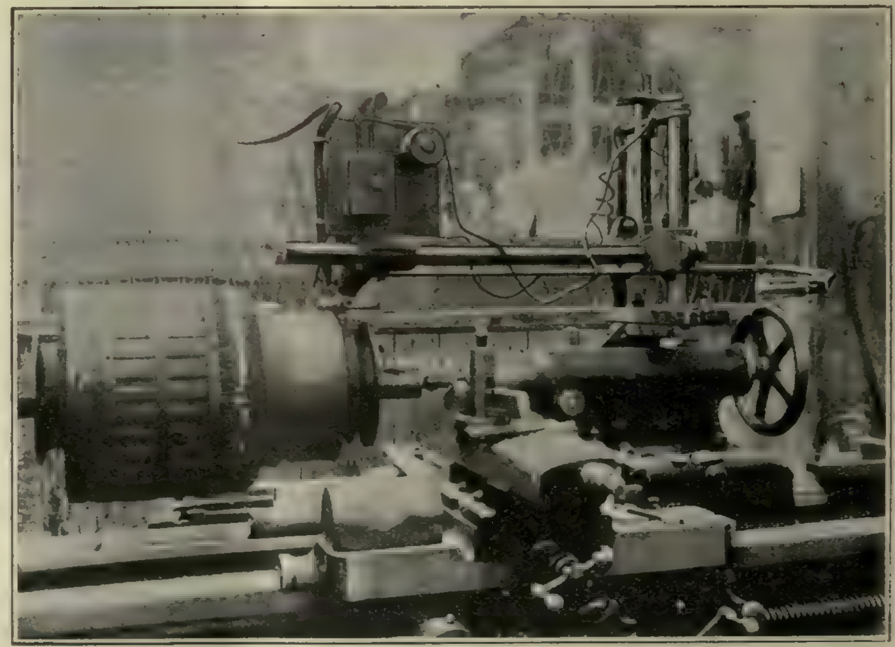
In the paint shop a double scaffolding made up in four sections is used. The end supports of this installation have no guides on the outside, but the intervening posts have guides and riders on both sides in order to accommodate one end of both planks. Not only is this a serviceable installation but its neat construction adds materially to the appearance of the various departments of the shop.

Commutator Slotter on Lathe

AFTER the turning of a railway motor commutator, grooving or slotting usually follows. The arrangement used in the Denver Tramway shops for performing both operations on the same lathe has the advantage of avoiding the necessity of moving the armature from one machine to the other. Once the armature is mounted in the lathe the commutator is finished completely in the one machine.

As shown in the accompanying illustration, a carrier clamped to the tail-stock of the lathe has both a vertical and horizontal carriage, the latter being mounted on two long guides fastened directly to the vertical carriage. The vertical motion is obtained by means of a hand wheel and lead screw. The horizontal carriage is controlled by a long curved hand lever shown in the illustration.

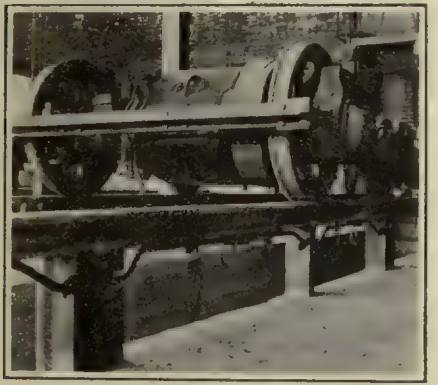
In practice, the vertical adjustment is used to set the milling saw for the correct depth of cut, and the slots are then milled by moving the horizontal carriage back and forth by means of the hand lever. The saw is driven by a small motor



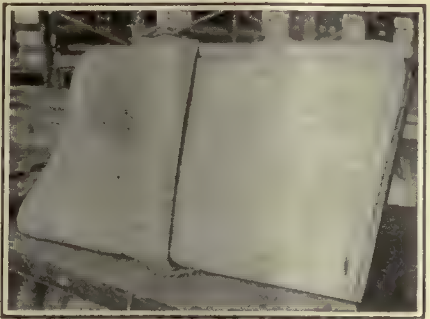
This Commutator Slotter Used in Denver Is Mounted Directly on the Lathe mounted on the horizontal carriage. This is hidden in the illustration by the small control board. The armature is rotated from slot to slot by hand.

Raised Track for Truck Overhauling

WORK of truck overhauling can be done more efficiently and with less tiring efforts by workmen if the trucks are raised to a height that makes it unnecessary for the workmen to bend over in making repairs. Realizing this fact, the Eighth Avenue Railroad, New York City, has provided a special construction for its truck-overhauling tracks at the new 155th Street shops. The walk alongside the track is depressed 18 in. below the top of the rail. Pits are provided 5 ft. deep below the top of the rail. The rails are mounted on columns formed of steel channels, which are inserted in the concrete structure forming the walk and pit walls. Traveling telpher cranes serve the track and facilitate removal of heavy parts during the overhauling. The raised portion of the floor alongside the depressed walk also serves as a bench.



Track Raised to Convenient Height to Facilitate Truck Overhauling



This Light Steel Sheet Prevents Vandals Cutting Seat Backs in Omaha

Sheet Metal Protects Rattan Seats

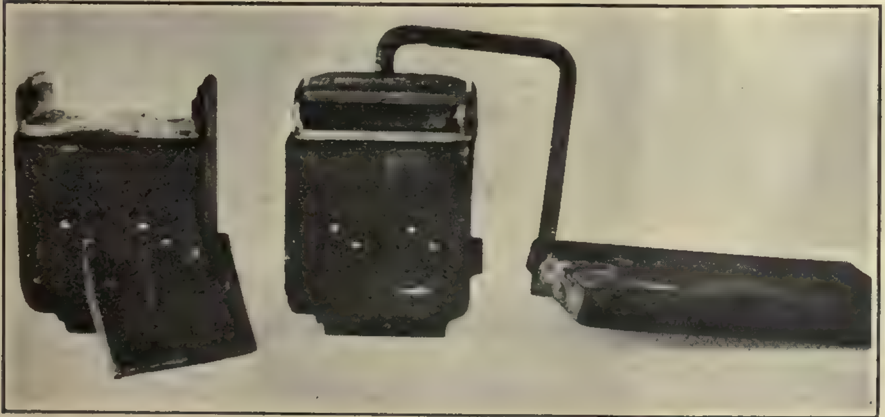
IN OMAHA, trouble has been experienced in the past from malicious passengers cutting the backs of rattan seats with a knife or other instrument. It has been found that the greatest damage is done when the knife is forced through the rattan and then a long jagged cut made.

To protect seats from this vandalism, the Omaha & Council Bluffs Street Railway, under the supervision of T. E. Wood, master mechanic, has adopted the practice of inserting a piece of light-gage galvanized steel behind the rattan, as shown in the accompanying illustration. This protection materially reduces the amount of damage done to the seats.

How Worn Brush-Holders Are Reclaimed at Detroit

AN INTERESTING method of reclaiming worn brush-holders has been developed in the shops of the Department of Street Railways, city of Detroit, as the result of a study by H. S. Williams, assistant superintendent of equipment. This consists of cutting out the front face of the holder, building up the worn brush way by brazing, and then brazing the front of the holder back into place.

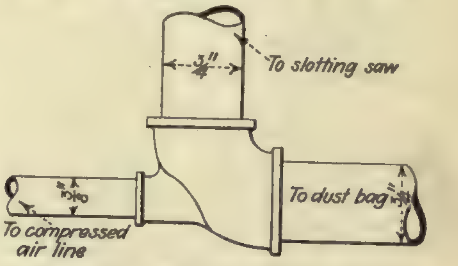
The front face of the holder is cut out with a gang miller, which leaves a shoulder on the two sides so that the brazing material can be readily built in when the front is replaced. After the front is cut out the worn portions of the brush slot are filled in with brass. The next operation is to machine this slot on the milling machine. A disk grinder is used to true up the back surface of the piece cut out of the holder, and the last operation then consists of brazing this piece back into place. Standard steel blocks are placed in the holder so that the slot will be of proper size when the operation is completed. The total cost of the operations described is $2.50 less per holder than the cost of making and machining new castings.



Condition of the Holder After the Front Has Been Milled Out, Also the Method of Holding the Parts Together for the Last Brazing Operation

Pipe Tee Used to Produce Vacuum for Dust Removal

AS AN auxiliary to its commutator slotting machine, the New York Central Railroad in its Harmon shops has a vacuum attachment for drawing off the copper and mica dust as the commutator is slotted.



Connection to Tee for Removing Dust by Producing Vacuum

This supplements the larger and more elaborate vacuum cleaners used for cleaning out inaccessible places in rolling stock and equipment.

A ¾-in. pipe connection extends down close to the slotting saw, and the other end of the vacuum attachment has a bag for receiving the dust. The novel part of the construction lies in the fact that a standard wrought-iron pipe tee is used to produce the vacuum. An accompanying illustration shows the connection. The tee is ¾ in. x ⅜ in. x ¾ in., with the ⅜-in. outlet connected to the shop air supply, which has compressed air at 125 lb. pressure. The ¾-in. outlets lead to the commutator slotting saw and to the bag as indicated. The expansion of the air from the ⅜-in. pipe into the ¾-in. chamber of the tee produces the vacuum and the dust is drawn off as indicated.

New Equipment Available

Arc-Welding Rheostat

THE Westinghouse Electric & Manufacturing Company has recently developed a new arc-welding rheostat which is compact and of light weight. The over-all dimensions are such that it can be taken on a street car platform, work car or in a small automobile. It is especially suited for welds between rail sections, cupped and battered rail ends and for special trackwork on crossovers, frogs, and switch points made of steels high in manganese or carbon. The rheostat has 15 steps of adjustment, so that when connected to any trolley line voltage between 400 and 650 volts, it will deliver from 60 to 210 amp.

Light-Weight Arc-Welding Rheostat

The control panel is mounted on the front and is protected from the resistor units by a metallic heat shield. This panel contains a 250-amp. magnetic contactor which is remotely controlled by a foot master switch which enables the operator to open and close the contactor when changing electrodes or for any other purpose. Four single-pole knife switches are also mounted on the panel for obtaining the required variation of welding current.

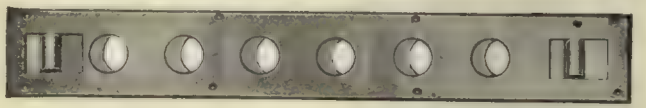
The resistance element consists of a number of alloy resistor units supported horizontally and insulated from the welded angle-iron frame.

Adjustable Ventilator for Buses

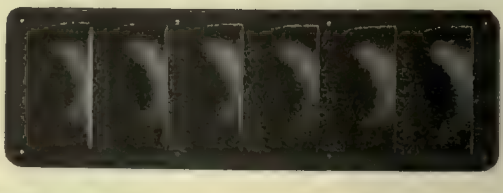
A HUNTER ventilator designed particularly for installation in the side panels directly above the windows of auto buses has just been placed on the market by the Electric Service Supplies Company. The new feature of this device is the arrangement by which it is adjustable from the inside of the vehicle so that passengers can control the ventilation.

The exterior portion of the ventilator is a pressed copper louvre plate with screw holes at the corners for attaching it to the body. This is so designed that it will allow the entry of the necessary amount of air but will prevent drafts and keep out the rain. The louvre is painted with one baked priming coat ready for finishing in any desired color.

When the louvre plate is installed a 1-in. diameter hole is drilled through the wood directly opposite each opening. On the inside of the panel a perforated polished brass plate is attached by screws and is so located that the perforations are in line with the holes in the panel. Under this perforated plate is a perforated slide which regulates the amount of ventilation.



Perforated Slide Plate

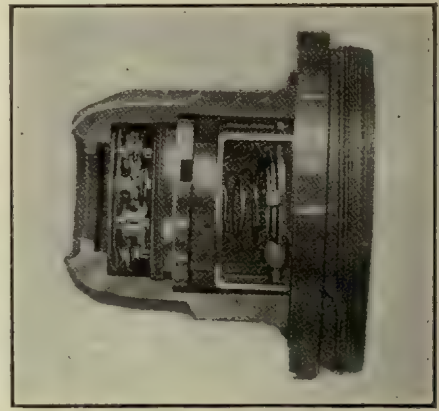


Copper Louvre Plate

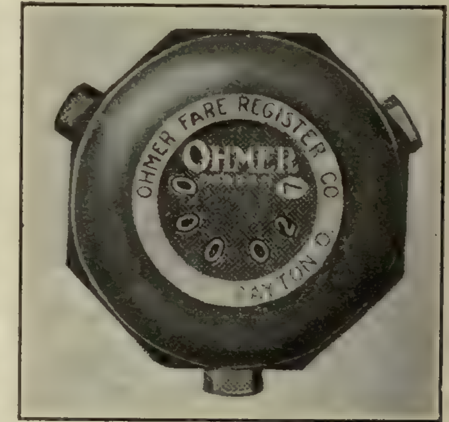
Exterior Appearance of a Bus Equipped with Hunter Ventilator

Mileage Recorder for Buses and Trucks

AN IMPROVED device for recording bus and truck mileage is now being placed on the market by the Ohmer Fare Register Company, Dayton, Ohio, under the name of Ohmer Hub-Odometer. This is a redesigned and improved form of recorder previously made by the American Taximeter Company and is arranged for installation on the wheel in place of the hub cap. The driving mechanism automatically engages the end of the axle and no assembly or adjustment is necessary.



Section of the Recorder



End View Showing Dial

The figures on the dial are always right side up, regardless of the position of the wheel, so that errors in reading are reduced. The dials are arranged with six figures, starting with tenths of a mile, so that a total mileage of 99,999.9 miles is recorded, after which the dials return to zero and begin to register again. The recorder always registers forward whether the truck is running forward or backward.

This form of recorder should be of material assistance to electric railways having service trucks or buses which require maintenance on a mileage basis.

The News of the Industry

Twin City Rapid Transit Buys Competitor

Suburban Motor Company Taken Over Under Plan for Co-ordination of Lines

The Twin City Rapid Transit Company, Minneapolis, Minn., has purchased the stock and assets of the Twin City Motor Bus Company and on Aug. 1 began to operate buses between Minneapolis and St. Paul and between St. Paul and White Bear Lake, a suburb, under the same conditions, schedules and rates of fare as have prevailed heretofore. The price paid was about $500,000.

This is the most important competitor of the railway between the Twin Cities and between St. Paul and White Bear Lake points. The purchase includes forty buses and the company's headquarters and shops at 164 West Fifth Street, St. Paul. H. L. Bollum, president and manager of the bus company, will continue as manager under the ownership of the railway.

Buses are operated between the Twin Cities on varying schedules according to the time of day and peak loads normally prevailing. The fare is 25 cents between any two points. The fare on the Minneapolis-St. Paul trolley line, which the bus system parallels in the city limits, is 6 cents between any two local points and 12 cents from either city to the other, with transfers. The bus line, being an independent corporation, will not issue nor accept transfers to or from trolley lines.

The bus line is not under supervision of the Minnesota Railroad and Warehouse Commission. That body determines the rates of fare charged on the electric railways.

The Twin City Rapid Transit Company has no present plans to buy other competing interurban bus lines. Neither does it plan to change the equipment on the line it has purchased. That equipment is exceedingly modern and the service is satisfactory to patrons.

NEW MOVE PROBABLY ONLY A START

This purchase is the first step toward consolidation of all the bus service on lines competing with the railway, to be accomplished by some plan not determined. Some of the car lines paralleled by bus service are the Stillwater, Lake Minnetonka, South St. Paul, all suburban lines.

Whether this plan will be accomplished at once or at some future date is not known. Neither is it known whether the plan will involve taking over present bus lines by purchase or installing new bus systems.

In the purchase of the Twin City Motor Bus line the railway has a nucleus for extending bus operation wherever it is feasible. As Vice-President T. Julian McGill explained:

> The purchase of the fleet of buses is in line with the policy of electric railways in other large centers. The motor bus has come to be regarded as an integral part of a modern city transportation system and electric railways have been supplementing their service with fleets of buses. It is felt that one company can better co-ordinate these systems and operate them more efficiently and economically.

Suit to Secure Back Pay in Des Moines Lost

The long-drawn-out suit of railway men in Des Moines, Iowa, to recover $58,000 back pay under the old Kirbye wage award ended with failure recently when Judge Martin J. Wade in the federal court held against them. The car workers, however, were permitted to keep $68,000 which has been paid them under the award. The judge held the Kirbye award expressly provided that the wages allowed should be paid only if there were earnings to pay, so that legally, morally or honestly there was no way the "back pay" could be allowed, since sufficient earnings did not come in. He said further that if the law were strictly enforced the men probably would never have received the money they did, but his opinion at that time concerning the ability of the company to pay was based on the feeling that sufficient earnings would be produced. The hopes of the court in this respect were never realized.

Detroit Municipal Railway May Run Buses

Buses of a design said to be entirely new are in prospect for operation on long hauls by the Detroit Department of Street Railways. According to an announcement made by acting Mayor Joseph A. Martin the Street Railway Commission has decided that a great benefit would accrue to the riding public were the city promptly to plan and develop a rapid transit motor system and co-ordinate it with the present trolley service. The commission does not aim to compete with the Detroit Motorbus Company.

One of the new buses is expected to be received soon and the prospects appear good that before late fall a fleet of buses will be placed in operation sufficient to supplement one of the main trolley lines. It is not intended that all routes will follow trolley lines. Stops will be far enough apart to give genuine rapid transit service without interfering with railway traffic.

The Street Railway Commission recognized the advantages afforded by a study of the operation of buses under the control of the Detroit Motorbus Company and gained much through the experience of that company.

Council Files Tacoma Grant Without Action

Railway & Light Company Seeks New Blanket Franchise Covering All Properties

There will be no new franchise for the Tacoma Railway & Power Company, Tacoma, Wash., considered or submitted to the people this fall, according to action of the City Council recently, when it voted, as a committee of the whole, to file, without action, the franchise proposed by the company. The grant contains a provision that it be submitted to the people at the Sept. 9 election. Some of the Councilmen are understood to be opposed to the conditions of the grant on the ground that it could be readily claimed that the action of the people in a vote, whether for or against the franchise, had no force, and that the new franchise is binding.

PETITIONS CIRCULATED ON CARS

The Tacoma Railway & Power Company has placed petitions on its cars asking that the City Council submit to a vote of the people at the coming primary election the franchise proposed by the company. Many street car patrons have signed the petition. It is being presented in two forms; one a card to be signed by an individual, the cards being given to purchasers of weekly passes; the other, petitions designed to be signed by a number of other persons, and both forms were handed out by street car conductors. In addition, the company is conducting a newspaper campaign in favor of the franchise.

The franchise which the company proposes would repeal all existing franchises, do away with gross earnings tax, paving between tracks, free rides for city employees and other present requirements. It would provide for supplemental or substituted bus services and otherwise alter conditions for the company, leaving the fare question to state laws regulating such matters.

MAYOR CRITICISES COMPANY

Immediately upon the circulation of the petitions, Mayor Fawcett issued an open letter to the public, urging citizens to refrain from signing the petitions, and attacking the motives of the traction company in preparing its proposed new franchise. Mayor Fawcett is strongly opposed to granting long franchises, stating that transportation may entirely change within the next five years.

The Mayor also took action at once following the petition circulation to bring to a head the matter of transfer payments between the city and company. He introduced a resolution that later was passed by the Council which provides that the city will pay 3 cents for its transfers taken up by the company and will receive the same amount for those of the company taken by its line. Heretofore the exchange has been on the basis of 3 cents for a company transfer and 2 cents for a municipal transfer.

Bus Line Permit to Pacific Electric Railway Affirmed

The Railroad Commission of California on July 24 passed upon the application of the Pacific Electric Railway for a bus franchise on Pico Boulevard from the terminus of the Los Angeles Railway's local Pico Boulevard street car line in Los Angeles to the city of Santa Monica. That body has affirmed its former order with modifications as to the fare schedules. These changes in the order are in the proposal of the railway to give transfers from its proposed Pico Boulevard bus line to its local railway lines operated in the Santa Monica Bay district and in reduction of the bus fares formerly proposed for use between intermediate points. In the revised order of the commission no reduction is made from the through or round trip rates that are now in force on the company's rail lines.

The matter came up on rehearing last May. The Santa Monica interests and three other automotive transportation lines competing for the Pico Boulevard bus line franchise at the time of the various hearings contendend that the fares of the Pacific Electric Railway as proposed to be charged on the bus line were higher than those in the schedules filed by the three other bus companies and higher than compatible with public interest. At the rehearing the commission stated that one of the points to weigh heavily in issuing the bus franchise was the financial responsibility of the various applicants to carry out the franchise conditions.

The revised order of the commission awarding the franchise to the Pacific Electric Railway cites that the company claims that 85 per cent of the travel on its lines is on commutation tickets.

Five-Cent Fare Clause Dangerous, Says Niagara Falls Councilman

An unusual procedure is being followed by Clark Shipston, a member of the City Council at Niagara Falls and a prominent wholesale merchant in the city, to awaken public sentiment in favor of the enactment of a resolution by the City Council of Niagara Falls, which would suspend the 5-cent fare clause in the franchise of the International Railway and allow it to appeal to the Public Service Commission for a readjustment of fares in the city.

Newspaper advertisements are being published by Mr. Shipston at his own expense in which he says there is danger that the Public Service Commission will allow the company to abandon other local lines in the city because the present rate of fare is not sufficient to pay operating expenses and give the International Railway a fair return on its investment.

One of the series of advertisements, "To the Street Car Riding Public" of Niagara Falls recalls the fact that the railway has been allowed to abandon its Sugar Street local line because it is losing money. The statement adds:

> If this line of reasoning is followed out, how soon and how many other local lines will they be allowed to abandon?
>
> The commission refused to consider an increased fare on the ground that the rate is fixed by franchise agreement, and the commission has no power to act. The commission has agreed to consider the question of a raise in fares provided the City Council consents.
>
> The question for the people of this city to decide is this: "Do we want to insist upon the terms of the franchise and keep the 5-cent fare with the possibility of less lines and poor service with continued litigation; or do we want to suspend the 5-cent fare part of the franchise and allow the Public Service Commission to look into the question of fares, with a view to giving the International Railway a rate that would be sufficient for operating expenses and a fair return on its investment?
>
> I am your servant and will do your bidding. Write to the Mayor and Councilmen. Let us have your view that we may be guided by the wishes of the street car riding public.

The International Railway has asked for permission to raise its fares in Niagara Falls from 5 cents to 7 cents, with four tokens for 25 cents. This is the same rate charged by the company in the city of Buffalo.

Mr. Shipston has been receiving letters of commendation for his series of advertisements asking the car riders for their views on the subject. It is generally believed the Council will vote to modify the 5-cent fare clause in the railway's franchise and the commission will thus be enabled to investigate conditions and consent to a rate increase.

Buses Menace Worcester's Suburban Railway Lines

Railway Finds Itself About at End of Rope in Places Where Unfair Competition Has Been Fostered to the Detriment of Its Earnings —Suspensions Appear to Be Inevitable

LICENSE boards and boards of selectmen in Worcester and vicinity, flooded with petitions for bus permits, have found in nearly every instance an overwhelming sentiment for motor transportation even in the face of statements by railway officials that the operation of jitneys would cut into profits to such an extent that the trolleys would be forced to suspend service.

In practically every instance, however, the statements made in its own behalf by the railway have been interpreted as an ultimatum that if the townspeople permitted bus competition the trolley service would be discontinued. Despite the contentions of trolley officials, sentiment at the town meetings held in several places has revealed the real depth of the feeling engendered by the communications.

The most significant expression recently has been in Leicester, a suburban community about 5 miles from Worcester city hall. One of the main city lines of the Worcester Consolidated Street Railway runs to the Leicester line and is not affected by any decision that the trolley officials may make regarding the future of the so-called Spencer and Leicester line. Leicester is served from the city line by the same cars that serve Spencer, a community of about the same size 12 miles from Worcester.

There are buses to Spencer and there is no question but that they have interfered to no small extent with profits of the trolley line. A year or so ago the Consolidated equipped the Spencer and Leicester line with one-man cars. There was no opposition to this move, but it has been noticeable since then that the bus patronage over this route has been on the increase.

Selectmen of Leicester were informed recently by the railway that the line would be discontinued unless the earnings increased. Immediately the impression spread that an effort was to be made to fight the bus by having the Selectmen refuse permits for operation of such conveyances. The Selectmen put the matter to a test vote in town meeting and Leicester registered itself almost unanimously in favor of continuing the bus lines to Worcester.

Henry C. Page, general manager of the Worcester Consolidated, says the vote does not finally settle the question whether the trolley service on the Spencer-Leicester line will be abandoned. He indicates, however, a strong probability that if the buses continue the trolley service will be discontinued. Before any definite decision is reached the Selectmen of Leicester must take formal action. If they carry out the wishes of the townspeople—and there is no reason to believe they will not—then the Consolidated directors will determine the future policy with respect to the trolley line. Mr. Page said:

> The company has made no threat. My letter to the Selectmen simply said that the Consolidated could not continue to operate its cars in Leicester and Spencer unless more money was forthcoming from passengers carried and that it was our opinion that this could not be while both buses and trolleys were doing business. Our cars on that line are now operating at a loss. Therefore if the Selectmen vote to permit the buses to continue I have no doubt our directors will decide to discontinue the running of cars in the two towns.

The Selectmen of Leicester gave the railway an opportunity to be heard at the town meeting but the company sent no representative. Ex-Mayor Percy Wheeler of Gloucester, where the railway quit and where local service is being given entirely by bus, explained the situation there.

The state of affairs at Leicester is typical of the general situation in Worcester and vicinity. Auburn, another suburban community about 5 miles from the city hall, asked to decide on operation of bus lines, voiced its approval of the buses. Three applications for bus licenses had been received by the Selectmen. Justly or unjustly, Auburn people denounced the Consolidated, its service, its fares and other features. It was charged that the traffic was not handled properly by the railway in that it virtually made the Auburn line a sidetrack.

The one exception has been in Oxford where the commuters have expressed a decided opinion in favor of trolleys. Seven hundred attended the town meeting during the week ended Aug. 4 when arguments were heard for and against granting bus permits to Lawrence Wiley and Ralph Davis. There were 313 in opposition to buses and 150 in favor. The victory here for the Consolidated is regarded as important. Oxford is the key to the situation in the south end of the county, for, without permits in that town, buses cannot run to Worcester from Southbridge and Webster, large communities 15 miles away from Worcester. Oxford was quick to appreciate that economic conditions made it impossible for both the railway and the buses to continue and it chose the trolleys.

FITCHBURG BUSES RESTRAINED

The City Council of Fitchburg has granted licenses to Charles A. Benedict, Fitchburg, and the De Luxe Company, Worcester, to run buses between Worcester and Fitchburg. This action has closed a controversy extending over a month. The restrictions imposed make it necessary for the buses to operate on a non-stop basis between Fitchburg and Worcester. The fare, it is expected, will be slightly in excess of the trolley fare, which is 72 cents. The Worcester and Fitchburg has been one of the principal suburban lines of the Consolidated for years. Cars are operated on an hourly schedule. Fitchburg is 25 miles from Worcester.

After the Worcester to Fitchburg buses had operated for several days they were ordered to stop on the ground they had not been licensed by the City Council.

The operation of the Worcester & Fitchburg line will not affect Leominster, another city served by the same cars, because of the non-stop clause. Leominster offers local bus competition to the trolley only on a line within the city limits. This route, operated to the plant of the Viscoloid Company, carries its heaviest traffic in factory employees, but enjoys excellent patronage at all times of the day.

Conference on Traffic Problem Scheduled in Fort Wayne

The Indiana Service Corporation, Fort Wayne, Ind., will open a series of conferences in Fort Wayne in which the "Nickel Plate" railway and local city officials will be asked to take part in the hope that a solution may be found for the increasingly difficult traffic conditions in the heart of the business district. Plans are already under way whereby the "Nickel Plate" road will elevate many of its grade crossing tracks within the city limits.

Robert M. Feustel, president of the railway, has recommended that a land grant under the railway lines may be made at a point near the present interurban terminal in the downtown district and a special street railway subway built there for the passage of the interurban and city cars. This project will be brought before the conference.

Competition in St. Louis

United Railways Plans to Enter Bus Field at Once in Competition with People's Company

A threat of competitive bus service to be operated by interests affiliated with the United Railways unless the People's Motorbus Company, St. Louis, accepts a plan for interchange of transfers from bus to street cars was made by Col. Albert T. Perkins, general manager for Receiver Rolla Wells of the railway, on July 28, at a public hearing before the Board of Public Service of St. Louis. The occasion was the hearing on the application of the bus company for permits to operate seven additional lines in various sections of the city.

Colonel Perkins opposed granting permits for main line bus routes that would parallel lines of the railway. He suggested supplemental bus lines and indicated the intention to form a rival bus line unless the People's Motorbus Company saw fit to co-operate with the railway by accepting permits for only such bus lines as would be supplemental to the street cars and enter into a plan for exchange of transfers, the Board of Public Service to prorate the 10-cent fare to be charged between the bus and the railway. Mr. Perkins favored permits being granted to the People's Motorbus Company to allow it to put in a line that would operate in the Lindenwood and Gratiot districts from the end of the Tower Grove line of the United Railways at Woods and Arsenal Streets.

Officials of the bus company later rejected the railway proposal as "economically impracticable." John A. Ritchie, president of the Omnibus Company of America, which has a minority interest in the St. Louis system, said he would never consent to an arrangement such as Mr. Perkins suggested as it would take all of the profits out of bus operation.

OPPOSITION COMPANY FORMED

The threat of interests connected with the United Railways to start bus service to compete with the People's Motorbus Company took definite shape on Aug. 4, when Secretary of State Becker at Jefferson City, Mo., issued a charter to the Motor Coach Company of St. Louis. The incorporators are: A. L. Shapleigh, Lawson M. Watts, Sam W. Greenland, Thomas Stanton and Stanley Clarke. They constitute the board of directors. Mr. Shapleigh is president of the United Railways and a member of the reorganization committee. Mr. Watts is assistant vice-president of the First National Bank, St. Louis. Messrs. Greenland, Stanton and Clarke are connected with Newman, Saunders & Company, who are assisting in the reorganization.

It will be necessary for Receiver Rolla Wells to obtain permission from the United States District Court to enter into a contract with the new bus company for interchange of transfers. The plan must also be approved by the Missouri Public Service Commission before it can be put into effect.

Mr. Greenland, operating expert for the reorganization committee, said no decision had been reached as to routes, but that an application for permits would be filed with the Board of Public Service when a survey reveals where supplemental bus service is needed.

Richard W. Meade, president and general manager of the bus company, characterized the supplemental bus plan as "twenty years behind the times." He said:

> We intend to give the people of Lindenwood and the other outlying sections the kind of service they want, a direct route to the business district of St. Louis without transferring and for a fare of 10 cents that will insure a seat for every patron. The United Railways Company has not frightened us a bit. Its proposal is a thing of the past.

One-Man Cars Operate in Hartford Temporarily

The Connecticut Company continued to operate one-man cars in Hartford on July 15, although a resolution of the Common Council, passed on Jan. 14, revoking the permission previously given to operate this type of car was to take effect on that particular date. Summary action against the company was delayed and on July 21 a resolution was passed giving the company permission to continue with one-man cars until it received a month's notice to discontinue that type of service. The permission was granted pending a decision by the courts in reference to an action instituted by the city against the company for the payment to the city of 2 per cent of the gross fares collected from the local lines in the calendar year 1923. Prior to the end of the six months period of one-man operation the company petitioned the Public Utilities Commission for permission to operate one-man cars anywhere in the state. A decision has not yet been handed down. The position of the company is that a state law gives the Public Utility Commission power over these matters so that the Common Council of Hartford or any other city really has no right to decide whether the company shall operate one-man or two-man cars.

Interurban Starts Bus Service

Three Fageol six-cylinder, twenty-six passenger, parlor car type buses have been placed in service on the Kansas City-Excelsior Springs highway by the Kansas City, Clay County & St. Joseph Railway as a step toward supplementing its interurban railway with motor coach service. The three buses are being used between Excelsior Springs and Kansas City and will be followed by others as soon as operating requirements necessitate. Thus travel on a two-hour schedule, leaving the terminals at fifteen minutes after the even hours from 8:15 a.m., until 8:15 p.m. The railway plans to operate its buses from the start as methodically and safely as it does its interurban cars.

Miss Liberty, Miss Excelsior and Miss Clay are the names given to the three vehicles. Many new and unusual features are incorporated in their construction. The seats are of the individual air cushion type and are so arranged that the isle is in the center. Passengers enter at a single door in the front, controlled by the driver. The body of the bus is painted a light blue with black and white trimmings. The general appearance and attractiveness of the coaches created considerable comment among the people along the route when the first runs were made.

Many Hurt in Brooklyn Accident

One person was killed and about forty others were injured when a train composed of wooden cars crashed into a train made up of steel cars on the evening of Aug. 5 at the Ocean Parkway elevated station of the Brooklyn-Manhattan Transit Corporation. G. M. Dahl, chairman of the executive committee of the company, made a statement in which he said:

> The unfortunate accident was clearly caused by the motorman. He had been in the employ of the company for about thirteen years and for the last eight years has been a motorman. His record has been good. Apparently, he became so thoroughly confused at the imminence of an accident that he lost control of his faculties and failed to apply emergency measures.

George McAneny, chairman of the Transit Commission, said:

> The commission realizes how deplorable accidents such as these are and how the circumstances surrounding them are apt to become matters of political or personal controversy. Because it has a full appreciation of these facts, it is not inclined to render hasty opinions.
>
> Major Philip Mathews, chief executive officer of the commission, with an adequate force of inspectors, was promptly at the scene of the accident and secured all available data. His full report, will, in the usual course, be made public.

Railway Has Approximately 250 Out of 400 Newark Buses

The Public Service Corporation of New Jersey, through its subsidiaries, is now the largest single operator of buses in the Newark territory. There are more than 400 buses in use in Newark, but the Public Service has acquired title to all but approximately 150 of them. On most of the lines in and out of Newark it controls a majority of the buses. It stands ready to purchase the remaining buses on lines where it is already represented and to this end has announced that it will treat with the bus associations rather than individual owners, if desired.

The announced purpose is to continue the co-ordination of street car and bus service whether or not all of the buses on any line come under Public Service ownership. On lines where more buses than are now operated by the company are required to permit the kind of service the public has the right to demand, application will be made for sufficient permits to bring the service up to the required standard in the public interest. Matthew R. Boylan, vice-president and general manager of the Public Service Transportation Company, the operating subsidiary for the railway's bus lines, said:

> In the new buses now operated and in our orders for additional latest type vehicles, as well as as in the operation of such buses as we now control, we have given evidence of our intention to supply the people of this section a co-ordinated service of cars and buses that will be a distinct improvement over anything of the kind that has been before provided, and I am confident that we shall get the co-operation of the public to that end.

Unprofitable Lines in Missouri to Increase Fares

As the result of a group of citizens voluntarily offering to assume the burden of an increased fare, the Southwest Missouri Railroad, Webb City, Mo., may not abandon its railway service over its Alba and Duenweg lines. A recent conference, at which were present railroad officials and interested residents of towns, resulted in an agreement for a continuance of a hearing that was in progress on the company's application to the Public Service Commission to abandon the above-mentioned lines.

It was suggested that the rate on the Alba line be increased instead of suspending service. Under the plan the railroad agreed to maintain service between Joplin and Duenweg on the Duenweg line for sixty days, and to give service over the Alba line a sixty-day trial, the latter under a rate increase from 15 cents to 25 cents. This was decided with the understanding that no objections would be made to the abandonment of the line, at once, north of Duenweg to Prosperity Junction, a distance of 6 miles, or to the present rate of fare. At the end of the sixty-day period the company will check up and decide whether it can continue to operate the two lines without a loss.

The agreement of the railroad officials to the Alba line matter carried a provision that the co-operation of Webb City be sought in making the sixty-day experiment at the new rate. The fare from Webb City to Alba has been 15 cents with three fare zones. The new fare will be 25 cents with five fare zones. The railroad will reserve its right to resume its hearing to abandon service over the two lines at the end of the sixty-day period, if the line still shows a loss.

Loss of revenue was the reason for the desire of the company to suspend service. Citizens of the towns affected, however, made pleas for "some sort of service," even if it had to be reduced service. Their testimony was based upon the need of the lines by workmen, particularly men engaged in various mining operations, as well as by the school children who reside in the rural districts.

News Notes

Fare Protest Filed.—Mayor Kendrick on Aug. 5 signed and sent to the Public Service Commission the city of Philadelphia's formal protest against the fare increase sought by the Philadelphia Rapid Transit Company. The company is seeking a change from the present rate of 7 cents cash, 6¼-cent ticket rate to an 8-cent cash or two tickets for 15 cents. The city claims in its protest that the present rates are sufficient to provide revenue for all reasonable needs and enable the company successfully to issue the necessary securities. The proposed rate is said to be "excessive, unjust and unreasonable" and would result in an "unsuitable and unreasonable classification" of the company's service, patrons and rates. Meanwhile the Philadelphia general committee is investigating the transit situation in Philadelphia to determine whether the company is justified in seeking the advanced rate.

Employees Get Increase.—At a meeting of the directors of the Wheeling Traction Company, Wheeling, W. Va., held recently, a measure was adopted awarding employees an increase in wages of 2 cents an hour. The present scale of 55 cents will therefore be increased to 57 cents an hour. The increase will affect about 500 employees of the Wheeling Traction Company, the City Railway and the Wheeling Public Service Company. It has not been announced definitely just when the increase will become effective.

Railway Service to Be Resumed.—Railway service will be resumed in Iowa City, Iowa, according to President Schulze of the Mississippi Valley Electric Company. He declares that the track which had been torn up has been relaid and everything is in readiness. Bus service was substituted early in June in the northeast quarter of Iowa City. The matter caused one of the hottest municipal fights that local sections have seen in some years. The company started bus service when new paving was to be done, declaring that the assessments to be made against it for the new paving would be confiscatory. The officials maintained that under their contract they could give either gasoline or electric service. The citizens, however, objected to the buses as less accommodating than the cars and the Council objected to the damage to the pavement that the heavy buses would entail. A compromise was effected whereby the company agreed to resume the service and the Council decided to lower the taxes of the traction company.

Chicago's Growth and the Railway.—The close relations between land values and transportation is explained in an article in the Chicago *Realtor* for July, by Henry A. Blair, president of the Chicago Surface Lines. Mr. Blair's article is the second of a series on transportation and its relation to and effect upon real estate development and value that has appeared in that magazine, which is devoted to the building and real estate interests of Chicago especially and the State of Illinois generally. He states that the practice of receiving contributions of property owners toward the cost of street car extension had become more or less common since the day several years ago when property owners in a residence section of Cleveland, called State Road, agreed to pay $1.50 a front foot to finance the extension of railway service out to this section. The plan, in Mr. Blair's opinion, has proved profitable to the property owners. The article gives in detail the growth of Chicago in relation to the growth of its street car system, stating that the railway system always has been ahead of the city's expansion, as "growth in population follows the extension of transportation." Speaking of the adequate service which the surface lines were striving to provide, he said that the time had come when something had to be done toward a solution of the traffic problem if the city was to continue to expand and increase in population. The Chicago Surface Lines were ready, he said, at any time to participate in any movement which would result in improvement.

Bus Application Denied.—Public convenience and necessity, according to a decision handed down by the California Railroad Commission, do not require the operation by the Crown Stage Lines of auto service between Huntington Beach and Long Beach, nor the operation of through stages between Riverside and Long Beach via Huntington Beach and via Westminster. The commission, therefore, denied the application of the Crown Stage Lines for certificates under which to establish the services. The Pacific Electric Railway opposed the application of the Crown Lines. It is directed to establish through rail service between Huntington Beach and Long Beach via Seal Beach within sixty days.

Employees Must Be Taught.—As a result of a recent accident on the lines of the Union Traction Company of Indiana, Anderson, Ind., officials of the company have been ordered by the Public Service Commission to institute a school of instruction for all employees in train service. The classes must be continued regularly until all employees are properly instructed in the application of safety rules. In the report on which the order was based, the commission held the company entirely responsible for an accident which occurred at a siding, 7 miles east of Indianapolis, on June 12, when a passenger train slid down a grade and crashed into a freight car, causing the injury of three people.

Injunction Obtained Against Preventing Higher Fare.—Judge Wade has granted a temporary injunction sought by the Omaha & Council Bluffs Street Railway to restrain the city from preventing the company raising its fare to 7 cents in Council Bluffs, Ia. The company will be required to file a $100,000 bond pending hearing on a permanent injunction. Counsel for the city said the case would be appealed to the United States District Court of Appeals. The company is losing $1,000 a day on its Bluffs lines, Emmet Tinley, counsel for the company, declared in federal court when hearing was begun on the company's fight for higher fares. This loss, he asserted, was estimated on the company's claim to a 7 per cent return on property in Council Bluffs.

Opposes Bus Franchise Extension.—The Charleston Interurban Railroad, Charleston, W. Va., is understood to be opposed to letting the buses of the Midland Trail Motor Transit Company into Charleston as a parallel and competing transportation line. A hearing was held recently by F. O. Sanders, supervisor of motor bus traffic, on the Midland Trail Motor Transit Company's application, for an extension of its franchise. The company operates between Huntington and St. Albans to a connection with the interurban railroad cars between Charleston and St. Albans. If the bus line is given an extension its buses will come in over the South Charleston Bridge alongside of the interurban cars.

Foreign News

Paris Starts Its Second Electric Suburban Line

Another section of electrified suburban service has been opened in Paris on that part of the State Railway running from the Paris Saint Lazare station to Bois-Colombes and Becon-les-Bruyeres, a distance of 9 miles. There will be forty-nine trains a day in each direction, the service running over the regular rails of the main line steam railway.

It is expected that the line will be extended next year to Saint Germain and Saint Cloud and in 1926 the interurban exterior section will be opened between Saint Cloud and Versailles and Marly. In 1927 the Bois-Colombes electric trains will be prolonged to Argenteuil and a link which will connect with the present electrified line of the State Railway running from the Paris Gare des Invalides to Versailles. The whole electrification scheme is to be completed in four years.

Sydney Has Record Traffic

Sydney, New South Wales, has about 1,000,000 inhabitants, 251 miles of track and 1,417 cars in active service, and during the last Easter holidays broke all records for passengers carried. Factors which contributed greatly to the riding were the holding of races for four days, a large agricultural show, which was in session for nine days, and a visit from the British Royal Naval Squadron. The number of passengers carried for the two Easter weeks was 13,513,226. This period included two Sundays, Good Friday and Easter Monday, though the last was wet. The number of passengers carried was approximately 40,000 in excess of last year. The revenue obtained was £145,746, or about £4,000 in excess of the revenue for the corresponding period in 1923. There was no serious accident. The heaviest traffic on any one day during the period was approximately 1,500,000 passengers. The number of passengers carried to the Agricultural Show during its nine-day session was 633,628, and to the racecourse during the four days of racing, 244,687.

A description of the Sydney tramway system, with plan of the routes and views of the agricultural fairgrounds and racecourse, was published in the issue of this paper for Jan. 13, 1923.

Speeding Up in West London

The London United Tramways are carrying out extensive improvements to the tramcars operating in West London. Seventy cars have been equipped with new high-speed motors and magnetic brakes. A further forty cars are now being similarly reconditioned. The cars are now running upon the Shepherd's Bush, Hanwell and Hounslow routes and the new motors are daily effecting a very considerable reduction in the trip time. For example, the trip from Hanwell to Shepherd's Bush has been cut from thirty-five minutes to twenty-eight minutes and that from Hounslow to Shepherd's Bush has been cut from forty-seven minutes to forty-one minutes.

The London Underground Extensions

The placing of contracts for the construction and extension of the City & South London Railway from Clapham to Morden and for the extension of the Charing Cross & Hampstead Railway from Charing Cross, linking up with the City & South London line at Kennington, marks the commencement of two of the biggest schemes which appear on the London underground companies' list of new works. It is expected that trains will be running between Clapham Common and Morden in December, 1925.

Work on the Morden line is now in full swing day and night. Vertical service shafts 50 to 60 ft. deep have been sunk at all station sites and the rotary excavators will immediately be in position.

The extension of the Hampstead line beyond Hendon to Colindale, Burnt Oak and Edgware is now rapidly approaching completion and it is hoped to open this line in July.

The southern section of the City & South London Railway between Moorgate and Clapham Common will also reopen for traffic in October, 1924.

Glasgow Tramway Manager's Salary.—At a meeting of Glasgow Town Council, on June 16, the salary of James Dalrymple, the tramway manager, was increased from £1,500 to £1,750. The increase was opposed by the Socialists and some other councilors.

Trackless Trolleys in Wigan, England.—Wigan Town Council has approved the proposal of the tramway committee to install a trackless trolley system on a portion of the route where the tramway track is in need of reconstruction. This will mean a saving of approximately £15,317, the estimate for the trackless trolley construction being £10,805.

British Electric Traction Company Reports.—For last year the gross profits of the British Electric Traction Company, holding company for a number of properties in the British Isles, wer £278,666, as compared with £263,824, and the net profits £152,359, against £134,740. The dividend on the ordinary shares was raised to 6 per cent, as compared with 5 per cent last year, and the amount added to the undivided profits account is £30,019, making the total amount to the credit of undivided profits £245,381, while the reserve account stands at £520,000. The company's investments during the year were increased by £313,164, the yield from them representing 5.62 per cent.

Financial and Corporate

Employees Take 10,609 Shares

Short Campaign for Stock Ownership Among Brooklyn Employees Proves Very Successful

Employees of the Brooklyn-Manhattan Transit Corporation to the number of 10,609 subscribed for a total of 20,235 shares of B.-M.T. preferred stock under the employees' stock ownership offer. Announcement of the sale was made on July 16. Subscriptions closed July 26. This represents an oversubscription of approximately 35 per cent, as only 15,000 shares were offered to the employees. Of the 15,000 employees in the transit system, some 13,167 were eligible to purchase stock. Final figures in the stock sale were made public on Aug. 2.

Because of the large oversubscription of shares, it was impossible to allot more than three shares to any subscriber. Applications were received from approximately 350 employees for the maximum of ten shares, but most subscriptions were for one or two shares, some 9,000 applications for 11,500 shares in one or two share lots being received.

Subscriptions were received from 4,091 motormen, conductors and other employees of the surface lines and from 2,963 employees of the subway and "L" lines, for a total of 13,310 shares. This makes a total of 7,053 employees in contact with the public who are stockholders in the company.

The B-M.T. offered to sell to its employees 15,000 shares of its preferred stock carrying dividends at the rate of $6 per share per annum. The stock was offered on terms which make the final net cost approximately $60 per share to employees who retain ownership for two years after final payment. It should be mentioned that the stock that was offered was acquired by the company in the open market for the express purpose of tendering it to the employees.

The stock was offered on the partial payment plan and the employees have the right to cancel their subscriptions at any time before the final payment is made. In such cases the company will return all payments made by employees together with interest at the rate of 5 per cent per annum on such payments. The company reserves the right to cancel subscriptions of employees who leave the service before completing final payment for the stock. In view of the large oversubscription for the stock, any shares available because of cancellations by employees in the service or those leaving the service will be distributed among employee-subscribers who were not able to obtain the full number of shares they desired at the first allotment.

The B.-M.T. management in its notice of acceptance sent to employee-subscribers expresses its appreciation of the interest and co-operation shown by them and for the enthusiastic response which resulted in such a large oversubscription.

Public Service Railway Makes Good Showing

The June earnings report of the Public Service Railway, Newark, N. J., shows that the company, which has paid no dividend to the controlling company since 1917, has made a remarkable recovery since the 1923 strike. Gross earnings in June were $2,401,098. Moreover, monthly net earnings have shown substantial increases. Net income in June was $446,211, more than sufficient to cover all interest and amortization charges, which totaled $431,652. In February of this year the net income was only $309,717, while interest charges exceeded $457,000. In August, 1923, the net deficit approximated $227,400 and interest charges were $470,000. A commentator on the affairs of the company says it is expected that further co-ordination of bus and railway lines and extension of the 5-cent zone system will increase earnings for the last half of the year.

Service Suspended in Port Huron

The City Electric Railway, a subsidiary of the Detroit United Railway, has discontinued operation in Port Huron, Mich., and the city commission has advised the railway if service is not restored promptly the city would take steps to terminate the franchise. Service was suspended following disagreement between the railway and the city authorities on the question of the use of one-man cars, operation of which is prohibited on city streets. Meanwhile transportation is provided by buses.

Foreclosure Appears to Be Ahead Soon in Kansas City

Progress has been made recently toward the adjustment of the difficulties of the Kansas City Railways, which has been in the hands of a receiver during the past four years. In fact a statement issued by the protective committee representing the holders of the first mortgage bonds indicates that steps have been taken to advance foreclosure proceedings.

Numerous questions were raised this spring regarding the status of certain mortgage bonds. The issues were tried in April. Judge Stone has now returned a decision affirming the validity of the indenture under which the bonds are secured.

The statement of the committee included a financial report of the affairs of the road during the past several years. The achievements of the management were reviewed at length in an article in the issue of the ELECTRIC RAILWAY JOURNAL for May 24, page 807.

Indianapolis Case Reviewed

Fare Increase Appeal Allowed on Basis of Evidence Presented Showing Need for More Revenue

Some very interesting facts in regard to the operation of the Indianapolis Street Railway, Indianapolis, Ind., were presented at the recent hearings before the Public Service Commission on the plea of the company for an increase in fare. In this case the decision of the commission was unanimous. It will be recalled that the fare was raised as asked to 7 cents cash, four tickets for a quarter, with a 1-cent transfer charge. The basic owl car fare of 10 cents is to remain. Double transfers with a twenty-minute time limit for each are allowed, superseding the present single transfer rule. Moreover, the company is ordered to extend its service to Broad Ripple by Sept. 1, under penalty of going back to the former rates if the provision for the extension is not met. Revenues for each month in excess of those for the corresponding month of 1923, after the order becomes effective, are to be placed in a special fund, this fund to be used solely for depreciation, although the company is allowed to borrow from 75 per cent of it at 4 per cent interest for capital expenditures, by giving notes for the amounts. The company is also ordered to submit monthly financial statements to the commission. The city authorities had asked the company for bi-monthly financial reports.

There has been constant agitation for the Broad Ripple extension, particularly since the suburb was annexed to the city about a year ago. The Union Traction Company of Indiana has heretofore been supplying the service to Broad Ripple, operating city-type cars over the 9-mile run. The route from the downtown district of Indianapolis is over the tracks of the Indianapolis Street Railway to the present terminus of city service at Forty-sixth Street, thence over the Kokomo division of the Union Traction to Broad Ripple, where the suburban cars leave the main line and run for a short distance to the terminal at the Broad Ripple Amusement Park. The line is divided into two zones with a 5-cent charge for each zone. Ten two-zone tickets are sold for 75 cents. The Union Traction Company has recently filed a petition with the Public Service Commission asking to raise the fare inside the zone in which city cars operate to 7 cents. Robert I. Todd, president of the Indianapolis Street Railway, has announced that negotiations are in progress looking forward either to the lease or purchase of the Union Traction Company's tracks and equipment to Broad Ripple, or the consummation of some satisfactory operating agreement.

The necessity for rerouting has been one of the main issues of the fare question and a citizens' rerouting committee was appointed by city authorities. The Public Service Commission in its order also announced its intention of issuing a supplemental order covering rerouting later on. One change, the combination of two routes, has already been effected. The tendency now, on practically all sides, is to agree that the company operating officials are best informed on the details of the subject, and therefore best equipped to plan constructive rerouting changes. The commission and the city officials are now co-operating with the company to that end.

A number of interesting exhibits were introduced by the company showing the inadequacy of the present fare. Among them was the following table showing various revenue comparisons for the first three months of 1923 and 1924:

REVENUE PASSENGERS

	1924	1923	Increase or Decrease
January	7,891,388	8,039,414	148,026*
February	7,523,475	7,280,484	242,991
March	8,076,233	8,465,504	389,271*
Totals	23,491,096	23,785,402	294,306*

PASSENGER REVENUE

	1924	1923	Increase or Decrease
January	$396,168.80	$401,937.95	$5,769.15*
February	377,796.15	364,019.30	13,776.85
March	405,195.35	423,246.03	18,050.68*
Totals	$1,179,160.30	$1,189,203.28	$10,042.98*

TRANSFERS

	1924	1923	Increase or Decrease
January	1,570,817	1,652,562	81,745*
February	1,501,960	1,524,490	22,530*
March	1,611,284	1,748,439	137,155*
Totals	4,684,061	4,925.491	241,430*

TRANSFER REVENUE

	1924	1923	Increase or Decrease
January	$31,805.03	$33,538.54	$1,733.51*
February	30,396.72	30,959.84	563.12
March	32,225.68	35,541.71	3,316.03*
Totals	$94,427.43	$100,040.09	$5,612.66*

* Decrease of 1924 as against 1923.

Expenditures for maintenance and replacement of paving during 1922 and 1923 are shown in the following statement:

	1922	1923
January	$8,297.77	$9,777.40
February	5,839.64	5,520.07
March	6,447.52	7,853.68
April	7,569.17	8,601.32
May	10,798.52	12,775.84
June	8,615.22	14,531.53
July	13,432.64	17,559.68
August	14,339.79	24,914.27
September	8,862.65	15,799.00
October	12,220.00	20,546.05
November	9,134.28	11,278.28
December	7,743.04	11,645.10
Totals	$113,300.25	$160,802.22

The maintenance of paving increased $47,501.97 in the year 1923 over the year 1922.

An audit made by the commission of the company's financial operation covering 1922 and 1923 showed the following:

	1923	1922
Total operating revenues	$5,489,200	$5,517,457
Total operating expenses, including taxes, but no provision for depreciation	4,454,228	4,471,716
Net operating revenues	$1,034,972	$1,045,742

The audit also showed that although the company was previously authorized to set aside 21 per cent of gross revenues for maintenance and depreciation, it was compelled to use $98,285 in excess of this amount for necessary repairs during 1923.

The company introduced an exhibit to show the following summary of expenditures required for maintenance and equipment in the next five years:

1924	$515,000
1925	510,000
1926	390,000
1927	390,000
1928	371,150

It was brought out by the city during the hearing that of eighteen street railways in cities of more than 200,000 population in the United States, the average return per revenue passenger in Indianapolis is lower than that of any other city with the exception of the municipal system in San Francisco. It was pointed out, however, that San Francisco has the advantage of water power for the generation of electricity while Indianapolis has to depend on steam. The city's exhibit also showed that the maintenance and depreciation figure in Indianapolis of 1.26 cents per revenue passenger was lower than that of any of the other of the seventeen cities with the exception of Washington, D. C., where it is 1.22 cents.

Fewer Passengers in St. Louis

The United Railways, St. Louis, during the quarter year ended June 30 carried 3,856,112 fewer passengers than for the same period in 1923, according to the report filed with the city on July 16.

The figures submitted show that 67,912,316 passengers were carried during April, May and June this year, while 71,768,428 were hauled during the corresponding period last year and 69,066,402 in the first quarter of this year.

The average number of cars operated during the quarter was 1,395 on week days, 1,286 on Saturdays and 702 on Sundays. Last year the average number of cars operated was 1,407 on week days, 1,318 on Saturdays and 736 on Sundays.

The figures for the past quarter support the contention made before the Board of Public Service on July 15 by R. J. Lockwood, assistant manager for the United Railways, to the effect that travel fell off to a greater extent on railway lines that came in direct competition with the existing bus lines than it did on lines with which the buses do not compete.

Rate of Return in New Orleans Six per Cent

The second quarterly report of the New Orleans Public Service, Inc., New Orleans, La., embracing the months of April, May and June, shows a rate of return of only 6 per cent in all of its departments. The allowed rate of return is 7.5. The contributory cause of this slump was the increase in the rate base from $55,734,535 in April, when the rate of return was 7.06, to $56,841,707 in June, when the rate was 5.26. The general depression was another factor which contributed to the drop in the rate of return by reducing receipts.

The gross corporate income of the railway department shrunk from $147,501 in April to $116,595 in June.

The gross corporate income for all departments for the second period of the year decreased from $874,129 in 1923 to $847,253 in 1924, with a rate of return from 6.55 in 1923 to 6.0 in 1924. The gross corporate income for 1923 and 1924 is respectively $1,874,176 and $1,864,725, while the rate of return is respectively 6.81 and 6.99, showing that the change in the rate base is discernible in the decreased rate of return.

Peoria Railway Wants to Abandon Passenger Service

The passenger business of the Peoria Railway, Peoria, Ill., has been greatly affected by bus and private automobile competition, according to a petition for permission to discontinue the service, filed with the Illinois Commerce Commission. The road operates freight trains by steam and passenger cars by electricity. It asks to be permitted to discontinue the operation of the passenger cars, but wants to maintain the freight service.

The road was constructed about fifteen years ago, and about ten years ago the stock was purchased by the Chicago & Alton and the Chicago, Rock Island & Pacific, each road controlling 50 per cent. The line is operated alternately each year by one road and then the other.

During the past year the road has lost an average of $1,600 per month on its passenger service, its figures show. During the first five months of the present year 51,355 fewer passengers were carried than in the same period two years ago, and 74,509 fewer than in the first five months of 1921.

Seattle Considers Purchase of Rainier Valley Line

By a unanimous vote, the City Council of Seattle, Wash., has agreed to enter into negotiations with the Seattle & Rainier Valley Railway looking toward the purchase of the privately owned lines for operation in connection with the municipal system. Chairman E. L. Blaine of the finance committee and Philip Tindall of the utilities committee have been directed by the Council to start negotiations immediately.

Five years ago, shortly after the city purchased the railway lines from the Puget Sound Traction, Light & Power Company, the Council considered acquiring the Rainier Valley System, but the private company refused to consider any deal based on an appraisal made by the Council. Councilman William Hickman Moore, acting for the Council, appraised the valley lines at $765,000, and proposed allowing $70,000 additional for a fill which the railway company had made on Rainier Avenue. The company's liabilities at that time, Mr. Moore reported, were $1,600,000.

The Seattle & Rainier Valley Railway operates a twelve-mile line from Fourth Avenue and Stewart Street to Renton, along Fourth Avenue, Dearborn Street, Rainier Avenue and the shore of Lake Washington. The company also has a branch line from Rainier Avenue and Genesee Street to Fiftieth Avenue South and Hudson Street, on which a shuttle car is operated. The company serves a population estimated at 30,000 to 40,000. Rainier Valley residents at various times have urged the city to purchase the lines, and have also requested the city to compete with the Rainier line by running buses on Empire Way and other thoroughfares. Car riders can obtain transfers to and from the Rainier Valley lines upon payment of an 8⅓-cent token fare, but both the municipal and private systems have tokens which are not interchangeable.

Councilman John E. Carroll, who proposed the resolution providing for negotiations with the company, advised the Council that his investigations convinced him that the city could operate the lines profitably, and at the same time probably improve the service.

Walsh Holdings in Iowa Sold

Walsh Brothers, Davenport, Iowa, have negotiated the sale to George M. Bechtel & Company, representing the Southern Iowa Utilities Company, of electric light, power, gas and electric railway properties in Burlington, Morning Sun, Wapello and the Sigourney group, for a consideration reported to be more than $4,000,000.

The sale represented disposal of nearly half the Walsh Brothers' utility holdings and, with the exception of the Tri-City Railway transfer some years ago, is the largest transaction of that nature in the history of southeastern Iowa.

The Burlington electric railway system and the other light and power utilities there are the largest item of the group. The gas plants at Burlington and a number of small towns in that vicinity are counted in the transfer. The sale includes chiefly service lines, equipment and distribution systems as the major part of the current is now supplied from the Keokuk power plant. The Burlington Railway & Light Company, headed by E. C. Walsh, operates 23 miles of electric railway.

Income Decreases. — The city of Detroit, Department of Street Railways, Detroit, Mich., reports a total operating revenue of $1,704,780 in June, 1924, against $1,784,039 in June, 1923. These figures include revenue from transportation of $1,661,026 and $1,694,664 for the month of June, 1924 and 1923 respectively. Operating expenses decreased from $1,329,658 in June a year ago to $1,186,913 in June of the current year. The net income also showed a falling off from $62,139 in June of last year to $40,255 in June of the present year. Passengers carried totaled 41,730,246 in June, 1923, and 35,926,799 in June of this year.

Carhouse Property Sold.—The old carhouse block of the Broadway & Seventh Avenue Railroad, New York City, bounded by Fiftieth and Fifty-first Streets and Sixth and Seventh Avenues, has been bought by Realty Associates and Bing & Bing, Inc. The property has been held at $6,500,000, but the actual price paid for it was not made public. The sale is a part of the reorganization of the New York Railways. The proceeds will go in part to bondholders of the Broadway & Seventh Avenue road and in part to the general fund of the new system. A part of the area purchased will be offered immediately for resale. On the remainder an amphitheater will be erected to meet the need of the sporting interests of the city.

Purchase Report Delayed.—Fred S. Hunt, chairman of the street railway acquisition committee working on the proposed contract between the city of Milwaukee and the Milwaukee Electric Railway & Light Company, has stated that there will be no report to the Common Council until early in September. The sale terms which are being negotiated at Milwaukee were summarized in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 2, 1924.

Loss in Net Income.—For the six months period ended June 30, 1924, the International Railway, Buffalo, N. Y., reports an operating revenue of $5,134,538, against $5,366,746 for a similar period ended June 30, 1921. Operation and taxes decreased from $4,885,205 in 1921 to $4,729,757 in the period ended June 30 of the current year. The loss in the net income was further increased. For the months from January to June, 1921, it was $250,114 and for the six months period ended June 30, 1924, it was $357,703. Because of the strike in 1922 and its effect on the revenue and operating costs of the year 1923, the calendar year 1921 is used for comparative purposes.

Short Line to Discontinue. — The Missouri Public Service Commission has issued an order authorizing the Kansas City Power & Light Company to discontinue the operation of the railway system in Carrollton, Mo., and to remove the tracks. The City Council later passed a resolution approving the action of the commission. Private automobiles and buses have almost completely deprived the railway of patronage. The railway had been in existence for about twenty years. It consists of only a little more than 2 miles of track.

Transfer Completed.—The selectmen of Greenfield and Montague, Mass., met on July 31 with D. P. Abercrombie, receiver for the Connecticut Valley Street Railway, and completed the transfer of ownership of the Greenfield-Turners Falls branch to the two towns, under the state transportation area act. Of the $62,000 paid for the line, Greenfield pays $42,966 and Montague $19,034. The board of trustees that will operate the line include George W. Cary, chairman; Charles F. Mosher, secretary; J. B. Kennedy and Stuart Winch.

Seeks Partial Abandonment. — The Westchester Electric Railroad, connecting several cities and villages in Westchester County, N. Y., recently applied to the Public Service Commission for permission to abandon a portion of its Gramatan Avenue route and franchises in Midland Avenue, Bronxville. The petition says an agreement has been made with the New York, Westchester & Connecticut Traction Company, associated with the petitioner as part of the Third Avenue Railway system, whereby the other company will furnish service heretofore supplied by the Westchester line. The petition alleges that the Gramatan Avenue line has been operated at a loss ever since it started operation about Feb. 26, 1920. For ten years prior to that date this line had been operated by the Westchester Street Railroad as part of its through line between Mount Vernon and White Plains and was taken over by the Westchester Electric Railroad because of the default of the other company in the payment of track rentals and power due under agreement.

Seeks to Abandon in Riverside. — The Pacific Electric Railway applied to the California State Railroad Commission on July 23 for authority to abandon the larger portion of its local railway system in the city of Riverside and to substitute three motor bus routes over a portion of the area now served by the car lines. The application outlined that the railway would be obliged to make many repairs and improvements to maintain the local system in Riverside and that public patronage of the lines did not warrant such expenditures.

May Be Sold for Junk.—It is understood that the line of the Southeastern Ohio Railway operating between Crooksville and Zanesville, Ohio, will be torn up and sold for junk if the Public Utilities Commission grants permission to abandon the tracks. Officials of the company say that bus lines have depleted the income. No cars have been running since May, when the employees went out on strike. The work of dismantling part of the line has already been started.

Common Dividend Increased by Federal Company.—The Federal Light & Traction Company, New York, has declared an extra dividend of 75 cents on the common stock in 6 per cent cumulative preferred stock and the regular quarterly cash dividend of 1 per cent, both payable Oct. 1 to stock of record Sept. 15; also the regular quarterly dividend of 1½ per cent on the preferred, payable Aug. 30 to stock of record Aug. 16.

Acquires Columbia Railway.—W. S. Barstow & Company have announced the conclusion of negotiations for the acquisition by the General Gas & Electric Corporation of the Columbia Railway, Gas & Electric Company, Columbia, S. C. The purchase carries with it various subsidiaries. Plans of the purchasers include connection of the two sections, which lie about 100 miles apart, by transmission system.

Traffic Increases.—For the fiscal year ended June 30, 1924, the Municipal Railway of San Francisco, San Francisco, Cal., carried 4,000,000 more passengers than for a similar period a year ago. The receipts were increased by $185,060. During the 1922-23 fiscal year the railway carried 73,633,760 passengers, while 77,736,477 were transported during the 1923-24 year. Receipts for the year ended June 30 were $3,198,924 and those for the 1922-23 period were $3,013,552. Total accidents for the year ended June 30 were 807 or forty-six more than the previous twelve-month period. Car miles operated during the 1922-23 the aggregate was 8,676,611. These are the preliminary figures.

Deficit for Year.—J. H. McClure, receiver for the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, filed his report in the federal court at Toledo recently. It showed a deficit of $82,809 for the year ended June 30, last.

Power Purchase Completed. — Purchase of the capital stock of the Sierra & San Francisco Power Company of California from the California Railway & Power Company, a holding concern, was announced on Aug. 3 by H. M. Byllesby & Company. Ownership or control of the holding company, or of the Market Street Railway, of San Francisco, were not included in the transaction.

Cut in Service Necessary.—The York Utilities Company, Sanford, Me., has announced reductions in service and personnel because of exceedingly poor business. General Manager Dow says that due to the competition of the automobile and generally poor business conditions the financial standing of this property has reached a crisis. The income is no longer sufficient to meet operating expenses and reductions in the operating force and payroll have become necessary. Between Sanford and Biddeford cars will operate every two hours instead of hourly as heretofore. Temporarily twenty men were laid off and wages of the employees retained have been cut 10 per cent. Mr. Dow says that he trusts the condition is only temporary and that business will improve speedily.

Patronage Falls Off.—The report of the Calgary Municipal Railway, Calgary, Alberta, for the first six months of this year shows a falling off in patronage of 300,000, compared with the corresponding period last year.

Book Reviews

Electric Railway Practices in 1923

As Revealed in Presentations Made Aug. 15, 1923, to the Charles A. Coffin Foundation by Nearly a Score of Electric Railways. Edited by Henry H. Norris for the Foundation. Published by the American Electric Railway Association, New York, N. Y., 1924. $2.

This is a summary and review in book form of the presentations of the electric railway companies made last year in competition for the Charles A. Coffin prize. This award, which takes the form of a medal for the company and a gift of $1,000 to the "employees' benefit" or similar fund of its employees, is to be an annual award to the electric railway company which, during a given year, has made a distinguished contribution to the development of electric railway transportation. The award is one of several made by the Charles A. Coffin Foundation, which was formed in 1922 by the directors of the General Electric Company.

The administration of the contest was in the hands of the American Electric Railway Association, which appointed as a committee C. D. Emmons, Britton I. Budd and James H. McGraw. This committee laid out a plan for the competition embodying eight principal points upon which the award would be made. These included: Initiative, skill and enterprise in popularizing electric railway service; outstanding success in gaining public good will; economies introduced in operation resulting from original ideas; economies in operation by taking advantage of developments originating with others; improvements in construction practice; particular success in conducting a safety program and actually reducing accidents; outstanding accomplishments in development of good relations between the railway and its employees; special accomplishments, aside from good management, tending to reduce the cost of new capital.

In its arrangement in presenting to the readers the material contributed by the various competitors for the Coffin prize, the book is divided into two main parts, the first of which, "More Riders and More Revenue," deals with the publicity features, while the second part, "Operation with Proper Regard for Economy," deals with operating practices. This was done in preference to printing in full the individual briefs, as it was felt the method adopted would give a better presentation for the industry of the practices developed.

An idea of the contents may be obtained from a statement of the chapter headings: In Part I: Better Cars Bring in More Revenue; Insuring High Quality of Service; Explaining the Scope of the Service; Telling the Public About the Service; Electric Railway an Integral Part of the Community. In Part II: Operating Practices that Conduce to Economy; Economical Maintenance and Good Management; Electric Railway Savings in Construction; the Accident Menace Can Be Controlled; Satisfactory Relations with Employees; Securing Capital for Improvements.

In each chapter are excerpts from the presentations of the various companies that deal with that particular subject. Thus the book forms a handbook on the best practices to be found in the electric railway industry today and should be a good guide for the progressive managers. It is well illustrated, and its 220 pages contain a vast amount of valuable matter to the railway man.

A Symbol of Safety

By Harry Chase Brearly. 290 pp. Illustrated. Doubleday Page & Co., New York.

The electric railways have made great strides in the past thirty years, but though the changes have been revolutionary, they are no greater than those effected in increasing the means of safety, both of property and of life and limb. The history of safety precautions is one largely of the application of scientific principles to the means for removing the causes of disaster, and as one of the greatest destructive agents, particularly to property, is fire, it is not surprising that some of the most important early steps along these lines were taken to reduce the fire hazard. This was largely the inspiration for the establishment of the Underwriters' Laboratories, about thirty years ago, and the book under review tells what these laboratories have accomplished and how they do their work. While fire prevention is still an important feature at the Underwriters' Laboratories, the phases of the work there include also protection against burglary, accidents from automobiles, etc. Altogether the book, though telling facts, is an interesting as a romance.

Handbook of Direct Currents

By K. C. Graham. 164 pages, illustrated. Simmons-Boardman Publishing Company, New York. $2.

This volume, one of the Railwaymen's Handbook series, was written to impart a knowledge of the fundamental principles of direct current theory. The language is simple and can be understood by those having no previous knowledge of the subject. The book is not mathematical, all problems being included in one chapter on elementary electrical calculations.

The book should appeal to electric railway shop men desiring an elementary knowledge of direct-current circuits, motors and generators and measuring instruments.

Theory and Practice of Public Utility Valuation

By W. H. Maltbie, 201 pp. McGraw-Hill Book Company, New York, N. Y.

The science of valuation, like that of many departments of physics, is in the making. Its beginning, in the modern sense of the word, dates back only some decades to the first efforts toward commission rate regulation. In consequence, laws underlying the science of valuation to a large extent are undetermined, and, a book like that of Mr. Maltbie, which helps greatly to an understanding of the fundamentals, is greatly to be welcomed, particularly by the layman for whom the book primarily is written.

The general method followed is a discussion in one or more chapters of each of the various principal methods of determining valuation, namely, by original cost, by capitalization, by market value of securities outstanding, by cost to reproduce new, etc. Then follows a very clear statement on overhead charges and working capital, intangible values and deductions from gross value. The subject of depreciation is treated in six chapters in a very lucid way, the various classes of depreciation, such as obsolescence, inadequacy, deferred maintenance, accrued depreciation, etc., being explained. Outside of one chapter, where the position of the United States Supreme Court in connection with the subject of accrued depreciation is explained, there are practically no quotations from legal decisions. Instead the author develops the subject analytically in his own language, and the book is notable for the clearness with which the various points are brought out.

Personal Items

Charles T. Dehore's Experience Gained in Cincinnati

Charles T. Dehore, who has assumed active management of the Toledo & Indiana Railroad at Toledo, has been in the railroad business practically all his life in and around Cincinnati. Brief announcement of his appointment was made in the ELECTRIC RAILWAY JOURNAL for June 14.

His railroad experience began with his connection as chief clerk to the general yardmaster of the old Cincinnati, Hamilton & Dayton Railroad at Cincinnati, where he served for two years. Then he joined the Kentucky Traction & Terminal Company at Lexington as chief clerk to the general manager and purchasing agent, which position he occupied four years. For the last twelve years he has been railway specialist with the General Electric Company, serving the territory about Cincinnati.

During the war Mr. Dehore served in the cavalry, but was transferred to the air nitrate division at Muscle Shoals and served in Plant No. 1.

He is secretary of the Cincinnati, Georgetown & Portsmouth Street Railway, vice-president of the Toledo & Indiana Railroad and vice-president of the Lake Shore Power Company, the corporation which controls the Toledo & Indiana system. He was graduated from St. Xavier College, Cincinnati, in 1908.

Clark G. Anderson Leaves Moline Property

Clark G. Anderson has resigned as manager of the Clinton, Davenport & Muscatine Railway, Moline, Ill. Mr. Anderson will leave for Wichita Falls, Kan., shortly, where he will assume the duties of assistant to the president of the Arkansas Valley Interurban Railway. Mr. Anderson entered upon a public career in Moline as city engineer. In this capacity he served six years. His ability as engineer gained for him a place on the first city commission, when the form of government was changed. He served practically all of his term in the department of public works, resigning near the close to accept a position with the traction company. He has been in the employ of the interurban company at Moline since 1914.

Albert Swartz, general manager of the Toledo & Western Railroad Company, now under the joint control of the Willys-Overland Company and the Wabash Railway, Toledo, has resigned and will go to Chicago to enter business for himself. He will be in the railway supply business. Mr. Swartz has been with the Doherty interests at Toledo for twelve years and in the railroad business in Toledo for twenty-seven years. It was announced some months ago that the successor company of the Toledo & Western Railroad would retain the services of Albert Swartz, who would have complete charge of operations. When the Community Traction was first organized Mr. Swartz was vice-president, previous to which he was in the employ of the Toledo Railways & Light Company and the Toledo & Western Railroad. Following his graduation from Toledo schools Mr. Swartz served a short time in the New York offices of Henry L. Doherty & Company, New York.

H. L. Bollum with Twin City Company

Outstanding Figure in Minnesota Bus Circles Continues with Railway Following Bus Purchase

Great interest attaches to the announcement made elsewhere in this issue to the effect that the Twin City Rapid Transit Company, Minneapolis, Minn., has taken over the property of the Twin City Motor Bus Company. Along with this announcement the statement was made that H. L. Bollum, president of the motor bus company, will continue under the new arrangement as general manager of the bus lines.

H. L. Bollum

Quite naturally the question that will arise is: What manner of man is Mr. Bollum? Very briefly the latest accession from the bus field to that of the electric railways is one of the outstanding figures in bus circles in his home state. His record speaks for itself. In addition to running the bus line he has been president of the Minneapolis Bus Terminal Association and of the St. Paul Union Bus Terminal Association, both projects of considerable magnitude. Most important, however, are Mr. Bollum's ideas of the business. In his own work he has built in substantial fashion, and wherever it has been within his power to exercise his influence with others in the bus business he has insisted on the application of the same high ideals that have characterized his own personal commitments. His material success is an excellent criterion to the correctness of the public policies to which he has constantly adhered. In brief, the philosophy behind all his acts has been the public, first, last and all the time.

As for the other side of the picture, the so-called economic side, he has looked ahead with amazing clearness to the need for building along substantial lines. He was one of the moving spirits in the plan to make a real organization of the Minnesota Motor Bus Association. He advocated uniform legislation for bus control and license. He was also a strong advocate of the present automobile tax in Minnesota, passed in 1921 with the understanding that the state tax was in lieu of all other taxes on automobiles. As indicated before, it was he who, perhaps, did most among the local bus operators to bring about a better realization of the need for proper terminals in both Minneapolis and St. Paul. He also was quick to realize the need for the application of accurate methods to the keeping of bus operating accounts.

Mr. Bollum moved to St. Paul from Goodhue County, Minnesota, in 1911, but did not get into the transportation field until the organization of the Twin City Motor Bus Company, in May, 1915. He began as secretary, later added the title of manager, and succeeded John Wade as president in 1920, retaining the title of manager also. From a line with only two buses operating intermittently the system has grown to one of forty-four buses, with thoroughly dependable service and complete inspection and shop facilities of its own.

Obituary

John H. Dunlap

John H. Dunlap, secretary of the American Society of Civil Engineers, who was seriously injured in a train wreck near Buda, Ill., June 30, died July 29 at the Presbyterian Hospital, Chicago.

Mr. Dunlap had been secretary of the American Society of Civil Engineers for two years, having been elected during the annual meeting at Portsmouth, N. H., in the latter part of June, 1922. He succeeded to the office left vacant by Dr. Charles Warren Hunt in 1920 and filled since that time by Herbert S. Crocker and Elbert M. Chandler, with the title of acting secretary. Mr. Dunlap left the position of professor of hydraulics and sanitary engineering at the State University of Iowa, Iowa City, to accept the secretaryship of the American Society of Civil Engineers. In addition to his university work he had devoted part of his time to practice of civil and sanitary engineering.

Mr. Dunlap was born at Harrisville, N. H., Sept. 9, 1882. He was graduated from the Thayer School of civil engineering of Dartmouth College in 1908 after receiving his A.B. degree at that institution in 1905. After graduation he joined the faculty of the State University of Iowa as instructor in descriptive geometry and was promoted until he became professor of hydraulics and sanitary engineering in the college of applied science at that institution.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Some Manufacturers' Problems

Manufacturers have their problems no less pressing in their way than those of the consumers. Of this fact, however, sight is frequently lost. For instance, take the matter of prices. Thus in a recent case which involved a contract for equipment and supplies to the amount of about $100,000, the manufacturer had to convince the prospective purchaser that he had only one price, and that that price was based on the highest quality plus a fair profit on the actual cost of production. There was to be no trimming of either price or quality. He got the contract.

It should be self-evident that manufacturers are interested in producing as cheaply as possible. In no other way can they stimulate or extend the market for their goods. Sight is often lost of this fact. Also things that redound to the benefit of the industry redound to the benefit of the manufacturers serving that industry.

The question to be answered in making purchases is not how cheap one can buy, but how well. Railways have been at great pains to secure rates which bring them a fair return and they should not begrudge a similar return to the manufacturer. One manufacturer of specialties recently expressed the fear that the publication of the statement of earnings of his company by the JOURNAL might be interpreted by some railways to mean that a reduction in price of his products was in order. This manufacturer is hardly to be blamed for that view. It is the purchasers who are to blame. Frequently they do not realize that the manufacturer's profit is based on a multiplicity of sales at a small profit on each, on which there would be no profit at all except for the ingenuity displayed by the producer in both his manufacturing and marketing operations.

Norma Company Changes Name

In order to realize the fullest value from its nationally advertised trademarks—"Norma" and "Hoffmann"—as well as better to describe the nature of its business, the Norma Company of America, Long Island City, N. Y., has changed its corporate name to Norma-Hoffmann Bearings Corporation. The management, personnel and policies will be the same as heretofore.

Some twelve years ago the "Norma" ball bearing was first introduced in America. To the original "Norma" line of open or separable ball bearings was later added a line of "Norma" closed or non-separable bearings, to meet the requirements of service where the latter, and more common type, is preferred. The company, in developing the market for its ball bearings, felt the need for a precision roller bearing for heavy loads and hard service. In order to meet this need, the company acquired, two years ago, the American rights in the patents, trademarks and business of the Hoffmann Manufacturing Company, Ltd., Chelmsford, England, large and well-known manufacturers of precision roller bearings.

To provide for the constantly growing demand for "Norma" precision ball bearings and to permit the manufacture of "Hoffmann" precision roller bearings and "Hoffmann" steel rollers, the company has just completed a new and modern plant on its 17 acres of property at Stamford, Conn., on the main line of the N.Y., N.H. & H. R.R.

Railways Buying Mack Buses

The International Motor Company has recently announced the purchase of a number of Mack buses by various electric railway companies. Among these are the Public Service Railway, Newark, N. J.; Boston Elevated Railway, Boston, Mass.; Connecticut Company, New Haven, Conn.; Pennsylvania-Ohio Electric Company, Youngstown, Ohio; Northern Ohio Traction & Light Company, Akron, Ohio; Beaver Valley Traction Company, Pittsburgh, Pa.; Chicago, South Bend & North Indiana Railway, Chicago, Ill.; Illinois Power & Light Company, Decatur, Ill.

Standard Invoice Form Recommended

The use of a standard invoice form is being strongly advocated by the National Association of Purchasing Agents. It is said that this would result in material savings in the purchasing and accounting departments of large corporations. It is pointed out, moreover, that the adoption of a form of the kind suggested would do away with the use of what are generally known as buyers' invoice forms. These latter forms are used by certain corporations in connection with their purchases. This practice is very distasteful to selling organizations, as the customer's private invoice forms are inclosed with every purchase order, and the vendor must render his invoices on those private forms. The great difficulty in the use of those forms comes from the fact that the customer's name is printed on the forms and the name of the vendor rendering the invoice must be typewritten thereon. Consequently any carbon copy retained by the vendor shows his own name but not that of his customer, and the carbon copy is of little value to the vendor as being an exact reproduction of the invoice he has rendered. Further than that, the carbon copy, having no trace of the printed portions of the invoice forms, leaves a lot of figures such as order numbers, requisition numbers, etc., without anything to indicate what they represent, so that the vendor is not able to distinguish his own order number from that of his customer. Again, the carbon copy made in this way does not tie into the regular accounting system of the vendor, so he is obliged, for his own benefit, to bill everything on his own forms, thus duplicating the billing operations. After the billing operation is completed a careful check must be made to see that the billing retained in the vendor's files agrees exactly with that sent out on the customer's private invoice form. The advocates of the use of the new form contend that all of this economic loss would be obviated if all invoices were rendered on the National standard invoice form.

Equipment Company Files Petition in Bankruptcy

The National Safety Car & Equipment Company, St. Louis, Mo., has filed a voluntary petition in bankruptcy with the United States District Court in St. Louis, listing its liabilities at $124,072, with book assets of $142,438, of which more than half represents unsecured bills receivable. The company manufactures railroad safety devices.

The petition indicates that the company's troubles have been due largely to inability to collect claims from debtors. The largest single claim listed as an asset is one for $79,069.

Pole Plant Sold

The Massey Concrete Products Corporation, Chicago, has sold to the Westinghouse Electric & Manufacturing Company its entire interest in the manufacture and sale of "Hollowspun" concrete posts and poles, including its plant at Milwaukee. The sale in no way affects the activities of the Massey company in its twelve other plants, where reinforced concrete pipe, piles, cribbing, signal material and other similar products for railroads and industries are manufactured.

Still Coming

All records for the sale of exhibit space at the Atlantic City convention have already been broken and applications are still coming in. At present, two months prior to the convention, approximately 77,000 sq.ft. of space has been assigned, whereas the total for last year, which was the record, was only 75,681 sq.ft.

Metal, Coal and Material Prices

Metals—New York	Aug. 5, 1924
Copper, electrolytic, cents per lb.	13 375
Copper wire base, cents per lb.	15.00
Lead, cents per lb.	7.50
Zinc, cents per lb.	6.51
Tin, Straits, cents per lb.	52 00
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4 325
Somerset mine run, Boston, net tons	2.075
Pittsburgh mine run, Pittsburgh, net tons	1 875
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1 625
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.25
Weatherproof wire base, N. Y., cents per lb.	17.75
Cement, Chicago net prices, without bags	2 20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.05
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11 625
Turpentine (bbl. lots), N. Y., per gal.	$0.84

Rolling Stock

York Railways, York, Pa., has announced specifications on the three interurban cars and the two city cars referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 2. The details of the three suburban cars are as follows:

Date order was placed	July 22, 1924
Date of delivery	Nov. 1, 1924
Builder of car body	J. G. Brill
Type of car	Passenger
Seating capacity	52
Weight:	
Car body	15,140 lb.
Trucks	10,760 lb.
Equipment	10,100 lb.
Total	36,000 lb.
Length over all	47 ft. 6 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. $11\frac{5}{8}$ in.
Height rail to trolley base	11 ft. $3\frac{3}{8}$ in.
Interior trim	Mahogany
Headlining	White enamel
Roof	Arch
Air brakes	G.E.
Axles	A.S.T.M.—A-20-21
Bumpers	5-in. channel
Car signal system	Farraday
Car trimmings,	Aluminum and bronze nickle-plated
Center and side bearings	Brill
Conduits	Duraduct
Control	K-35
Couplers	Brill
Curtain material	Pantasote
Destination signs	Keystone illuminated
Door-operating mechanism,	National Pneumatic
Fenders	Providence
Gears and pinions	G.E. helical
Hand brakes	Peacock drum
Heater equipment	Consolidated
Headlights	Golden Glow
Journal bearings	M.C.B.
Journal boxes	Brill, semi-steel
Lightning arresters	G.E., Type MD
Motors	Four G.E. 247-A
Motors	Inside hung
Paint	York Railways standard green
Registers	International
Sanders	Ohio Brass, air-operated
Sash fixtures	Edwards aluminum
Seats	Brill reversible, rattan
Slack adjuster	Brill, air-operated
Springs	Brill graduated
Step treads	Alundum
Trolley catchers	Earle
Trolley base	U. S.
Trucks	Brill 77-E-1
Ventilators	Garland
Wheels	26-in., rolled steel
Power-saving device	Economy meters

The specifications for the two city cars are similar to those for the suburban cars, the differences being the dimensions, weights and type of motor, which are as follows:

Seating capacity	44
Weight:	
Car body	13,400 lb.
Trucks	9,760 lb.
Equipment	6,900 lb.
Total	30,060 lb.
Length over all	42 ft.
Motors	Four G.E. 264

An interesting feature is that one of the city cars will be equipped with Brill rubber cushion wheels.

Mexico Tramways, Mexico City, Mexico, decided some time ago to purchase a number of motors for the larger cars and to transfer the present ones from these to cars of the smaller type so that they could be equipped with four instead of two motors. All double-truck cars will be equipped with four motors and air brakes.

Syracuse Railways Co-Ordinated Bus Lines, Syracuse, N. Y., subsidiary of the New York State Railways, has placed an order with the Brockway Motor Truck Company of Cortland, N. Y., for six chasses for operation on its lines in Syracuse. The bodies will be of standard city bus pattern, with entrance and exit at the driver's right to facilitate collection of fares. Leather-faced seats will be used; the seating capacity of each bus to be twenty-five persons.

Track and Line

New Haven & Shore Line Railway, Guilford, Conn., has recently completed a 4,000-ft. extension to Hammonasset Beach at a cost of $7,500. This extension forms a spur reaching the public picnic park maintained there by the State of Connecticut on Long Island Sound.

Interstate Public Service Company, Indianapolis, Ind., has started work on building the double track on Washington Street, Columbus, Ind. The laying of the track will be completed within two months.

Helena Light & Railway Company, Helena, Mont., will complete shortly the installation of new rails and paving on Sixth Avenue between Park Avenue and Main Street.

Johnstown Traction Company, Johnstown, Pa., has started work changing the location of the tracks of the Windber line between Bens Creek and Kauffman's Run. The track removal preparatory to improving the highway will cost between $40,000 and $45,000. New tracks are to be constructed to the left of the highway for approximately a mile and one half. A new bridge over Bens Creek is also to be constructed.

Winnipeg Electric Company, Winnipeg, Man., is completing construction of a double track extension from Academy Road to the south gate of Assiniboine Park.

Philadelphia, Pa.—The Department of City Transit has awarded contracts to the Keystone State Construction Company, for almost one-third of the construction of the four-track subway on Broad Street. The award covers the portion of the subway running from Stiles to Clearfield Street, a distance of 10,130 ft., or close to 2 miles. Contract 105-A covers the portion between Stiles and Dauphin Streets, the aggregate of the bid amounting to $7,660,648. Contract 105-B covers the distance from Dauphin to Clearfield Street, aggregating a cost of $6,554,451.50.

Power Houses, Shops and Buildings

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has awarded the contract for a two-story, 20-ft. x 60-ft. brick and concrete addition to the steam turbine room on St. Francis Street to Meredith Brothers. The architect's estimate was $50,000.

Union Traction Company, Anderson, Ind., has recently completed and put in service a new freight house at Muncie, Ind. The offices are in the center of the big building and overlook all parts of the structure. The freight house is one of the best equipped in the state of Indiana.

Sacramento, Cal. — Contracts have been awarded for the construction of a union electric railway terminal for the joint use of the Sacramento Northern Railroad, the San Francisco-Sacramento Railroad and the Central California Traction Company. The building contains a waiting room, offices, baggage department, café, stores and other conveniences. The investment in land and terminal facilities approximates $350,000. Wollett & Lamb are the architects for the terminal and the adjoining store buildings. The general contract for the terminal building has been let to George D. Hudnutt, Inc., for the sum of $54,487. The electrical work will be installed by the Latourrette-Fical Company for $3,064. F. H. Betz has been awarded the general contract for the adjoining store buildings, which will cost approximately $27,000.

Trade Notes

Industrial Works, Bay City, Mich., announces the appointment of Ridenour, Seaver & Kendig, Buffalo, N. Y., L. N. Ridenour, resident manager, as its representative in the Buffalo district.

H. L. Woolfenden has joined the Scott Valve Manufacturing Company, Detroit, and will have charge of sales promotion. Mr. Woolfenden is a graduate mechanical and electrical engineer. After several years spent as a consulting engineer in Detroit, he went to Denver in 1901 and engaged in engineering and contracting, later becoming associated with the Allis-Chalmers Manufacturing Company. While district manager at Denver, Mr. Woolfenden had charge of all sales and engineering work in the Rocky Mountain district.

E. Jones, formerly of the Chicago sales office of the B. F. Sturtevant Company, Hyde Park, Mass., has been appointed district sales manager of Missouri, Kansas and Nebraska, with headquarters in Kansas City.

Advertising Literature

Union Iron Works, Erie, Pa., has recently issued a booklet describing in detail the design and construction of its new Union universal boiler of the self-contained return flue type. The booklet shows interior and exterior views, as well as sections through the boiler, and a table gives data on all dimensions of importance.

American Locomotive Company and **General Electric Company** have reprinted in folder form an "ad" from the ELECTRIC RAILWAY JOURNAL on the Paulista electrification results.

Mica Insulator Company, New York, N. Y., has issued "Commutator Insulation and Assembly." This twenty-four page illustrated booklet describes the various grades of mica used for insulating commutator segments and tells how commutators are built up and baked after assembly. Information is also given on remedies for such defects as high or low bars, high mica, sparking, pitting and grounds.

Power Capacity

Count on Capacity

MANY a hand brake might be powerful enough, but fails through lack of *chain winding capacity*. Unless a brake mechanism is capable of taking up all the chain under the worst conditions of slack and worn brake shoes, then it's worse than useless. Because that's when it's needed —after the limit of air brake piston travel is reached.

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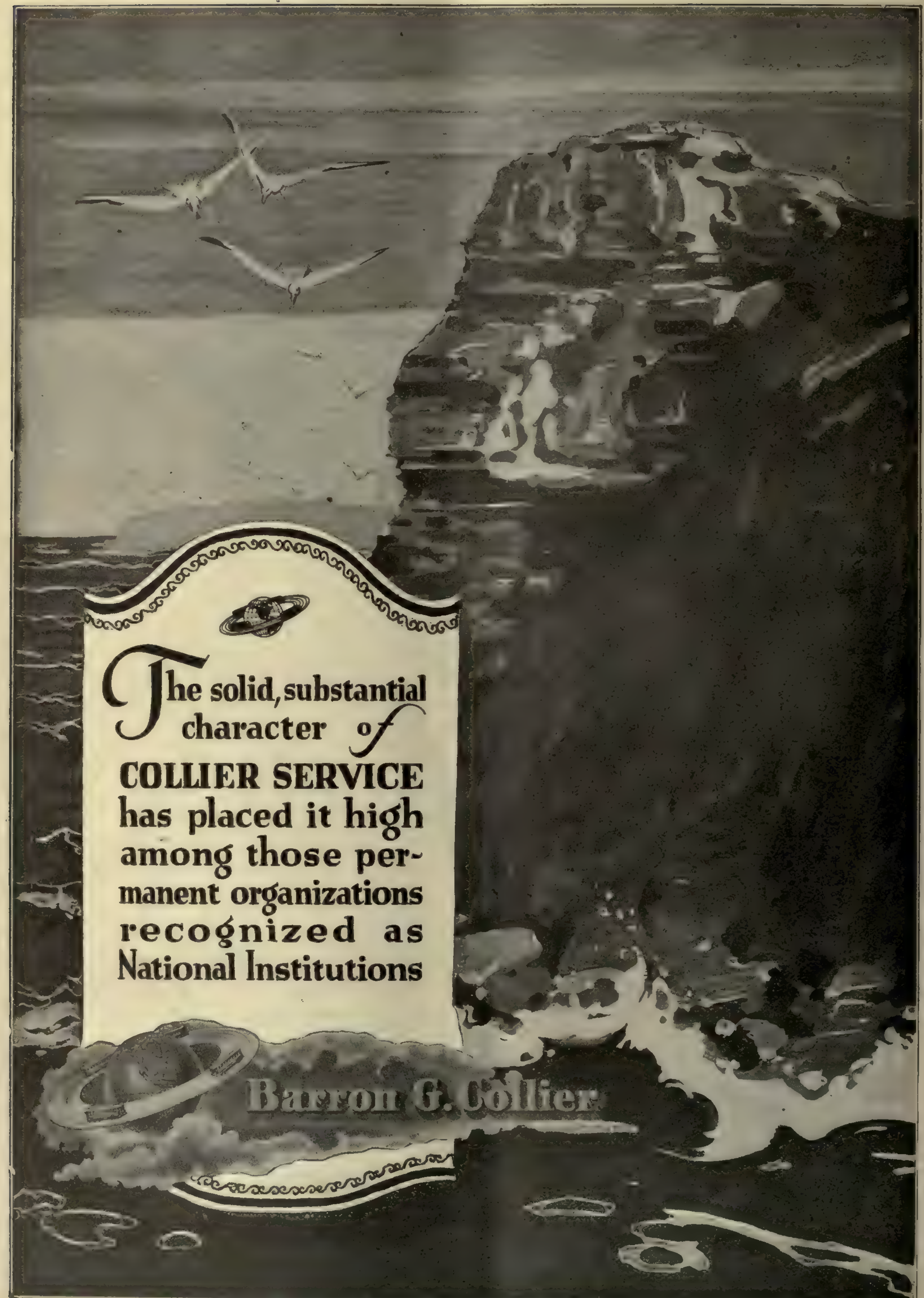

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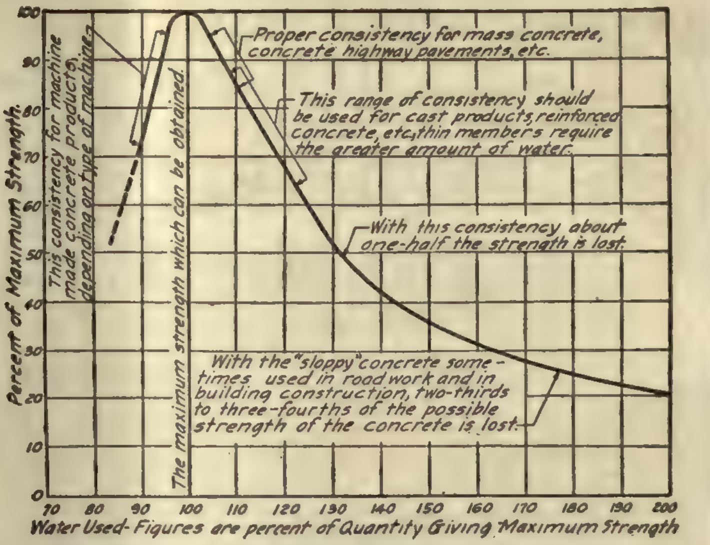
Barron G. Collier

When One Pint of Water Wastes Two Pounds of Cement



Effect of Quantity of Mixing Water on the Compressive Strength of Concrete

NOTE: In general construction, the maximum strength can rarely be obtained, but it is possible to obtain 70 to 90 per cent of the maximum strength without additional expense by restricting the quantity of mixing water.

Observe this curve closely. It shows impressively the effect of the quantity of mixing water on the strength of concrete.

It is now known that excess mixing water, not only weakens concrete, but that it is actually wasteful of cement. One pint of water more than necessary in a one-bag batch decreases the strength and resistance to wear as much as though two or three pounds of cement were left out.

Here is a fact, which if brought home to the superintendent and the foreman, can be of great practical value in raising quality on the job.

Wouldn't you like to have, right at hand for quick reference, a practical manual which tells how the quantity of mixing water can be closely controlled, so as to give concrete greater strength without using any more cement?

Then write today for our free booklet, "Concrete Data for Engineers and Architects." We will be glad to send you extra copies for superintendents and foremen.

Take full advantage of the service the Portland Cement Association has to offer. One of the District Offices of the Association is always near you. Get acquainted with it.

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A National Organization
to Improve and Extend the Uses of Concrete

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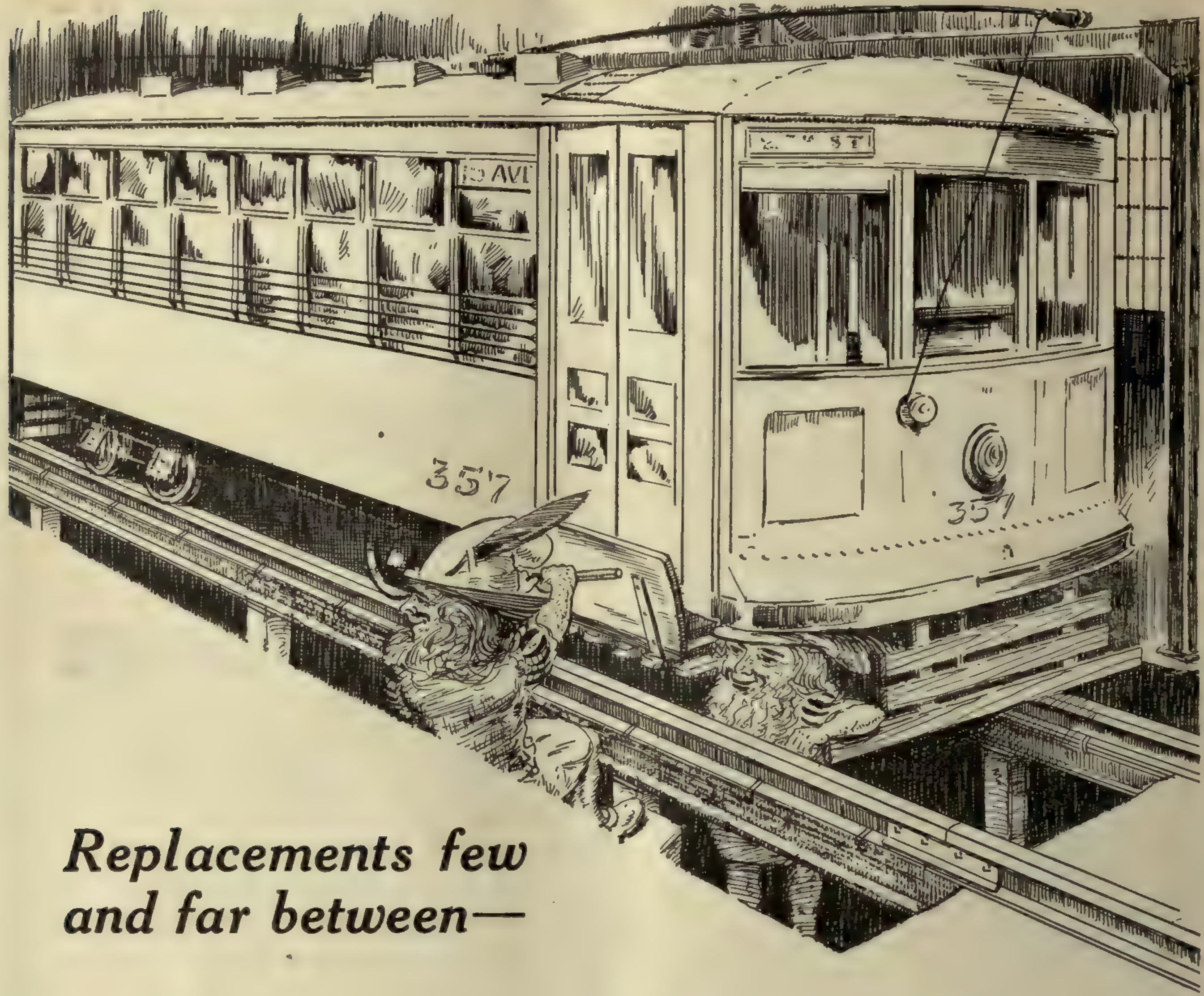

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Now is the time to pave the way for future savings! It costs so very little extra to use parts which have *triple the life* of ordinary stuff, that the difference doesn't even show. The showing comes when frequent replacements are eliminated, break-downs reduced and accidents prevented.

A trial tells

The
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Brake Pins
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And now—

THE SIX WHEEL MOTOR COACH

Since man first learned to put wheels under a load, the development of transportation has largely depended on the better use of wheels.

First the two-wheel ox cart—then the four-wheel vehicle, increasing in speed and load capacity until the age of steam and electricity taught us the limitations of four wheels.

Engineers put more wheels under railway locomotives and coaches—and the improvement made four-wheel cars on rails forever obsolete.

The Motor car went back to the four-wheel principle, and developed it to the limits of its speed and load capacity.

Now comes a revolution in motor car design—the Six Wheel Coach! Thus Science has solved the problem of increasing, with safety and economy, the load which may be carried on our highways and the speed with which it may be carried. Here is a development of tremendous significance in the future transportation of the country!

O. M. Schwab.

Chairman of the Board
The Six Wheel Company

The SIX WHEEL Coach

—by providing greater traction
—by doubling the number of brakes
—by reducing the shock of road impacts to one-fourth

This means speed, safety, comfort and long life for the coach

The first great advance embodied in the Six Wheel Coach lies in the four-wheel rear assembly.

This provides greater traction, and the braking advantage of four wheel brakes, all in the rear.

It makes possible, for the first time, the economical use of pneumatic tires on vehicles of large capacity.

It makes possible a much lighter coach to carry such loads. Power ordinarily used to move the dead weight of the coach itself, is freed to move the profitable load.

It makes skidding practically impossible.

It makes possible a speed of more than 50 miles an hour, with safety and comfort.

The second great advance embodied in the six wheel coach is the detachable motor unit. Radiator, engine, clutch and transmission—all in one assembly can be taken out and replaced in less than an hour. The entire rear-end assembly can be taken out and replaced in thirty minutes. For fleet operators, this means uninterrupted schedules—the dependability which the traveling public demands.

The third great advance is the extremely low center of gravity, contributing to speed with safety, convenience of getting in and out, and attractive appearance.

This greater traction and braking surface—the safe, low center of gravity—and the touring-car riding qualities—made it possible for a 5-ton six wheeler, fully loaded, to cross from Los Angeles to New York in 6 days, 15 hours running time. The Six Wheel Coach gives highway transportation the reliability of a transcontinental train.

revolutionizes transportation

You can count on bigger profits from the SIX WHEEL Coach

—because decreased road shocks largely reduce depreciation and repairs,

—because readily interchangeable units make it possible to keep the Six Wheel Coach earning all the time,

—because increased speed (with greater safety) means quicker trips, and quicker trips mean *more* trips,

—because the increased number of wheels reduces all the factors of wear on tires, and greatly increases tire mileage,

—because a better grip on the road makes skidding virtually impossible and other causes of accident less possible.

In addition, the Six Wheel Coach will attract *more* passengers and *a new class* of passengers to bus transportation. It offers, for the first time on the highways, the speed, comfort, safety, luxury, and uninterrupted schedules which the traveling public expects of a common carrier. It creates a new feeling of friendliness toward bus transportation on the part of the general public, for it covers the highways without pounding them to pieces. The same qualities which save the car, save the roads.

Charles M. Schwab, after a generation of leadership in American industry, regards the six wheel principle as revolutionary in the progress of transportation, and he has placed his name and organizing ability behind it.

The Six Wheel Coach comes to you a complete unit of transportation. The all-steel body, with its de luxe refinements of design, arrangement, and finish, is the work of specialists in this organization with many years of experience in this field of manufacture. The powerful, silent, six-cylinder motor, the frame, the axles—every part which goes into the Six Wheel Coach—is the highest development of the World's leaders in these fields. The Six Wheel Coach is backed by an improved, doubly fortified system of national service.

THE SIX WHEEL COMPANY
PHILADELPHIA, U. S. A.

Showing the flexibility of the four-wheel rear assembly. This patented assembly is pivoted on the frame midway between the two pairs of wheels. Therefore, an obstruction sufficient to raise one wheel 1 foot, raises the point of support only 6 inches. In other words, the shock of each road impact is cut in two.

This fact, coupled with the fact that pneumatic tires are used, reduces the shock of road impacts on the Six Wheel Coach to one-fourth the shock sustained by a solid tire vehicle of the same capacity. In a test conducted by United States Bureau of Roads, an ordinary 5-ton truck with new solid tires and carrying a load of five tons hit the road with a force of 29,000 pounds after going over a bump. A Six Wheel Truck, of similar capacity, and loaded with nearly nine tons, struck a blow of only 7000 pounds after hitting the same bump at the same speed.

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For half a century Hale & Kilburn has spe
cialized in designing seating equipment suitabl
for every type of passenger transportation an
has originated all the important improvement
in this line. H & K Seats are in use upon nearl
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Seats for every type of Motor Bus.
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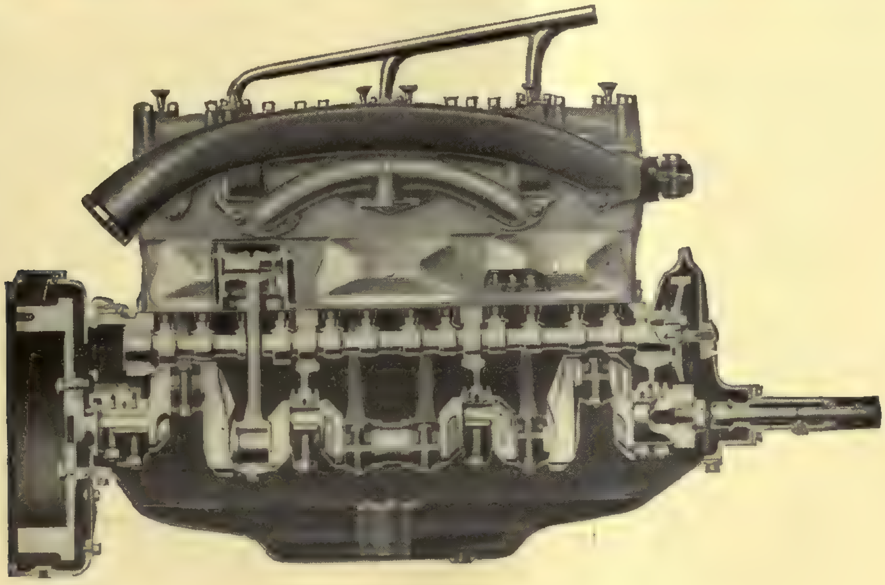


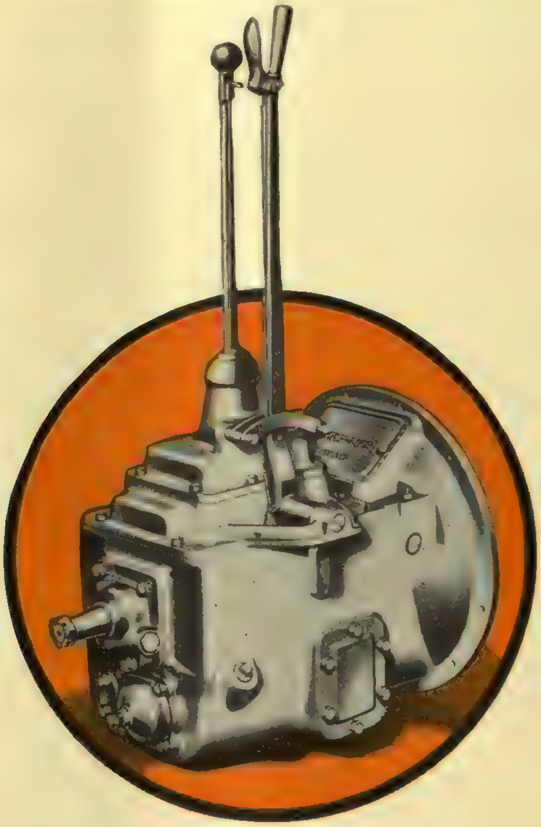
Standard Equipment

The RED SEAL Continental Motor, Model 6B

Longitudinal Sectional View

THE SIX WHEELER is new—but years of specialized experience are represented in the units that combine to make it an unparalleled achievement. It is powered, for instance, by the world-famous Red Seal Continental Motor, the motor that has helped to set increasingly high standards of efficiency in the automotive industry. Now, with its speed, its flexibility and its absolute dependability, the Continental Six Cylinder Bus Motor helps the SIX WHEELER to establish a new high standard of efficiency in bus transportation.

CONTINENTAL MOTORS · AMERICA'S STANDARD ·
Powerful as the Nation
TRADE MARK REG. U.S. PAT. OFF.



Brown-Lipe Transmission and Clutch
represent the best that can be built

Past performances have earned for it
an enviable reputation for
dependability and stability

It is natural that Brown-Lipe
Transmission should be
selected for the "Six Wheeler."

Brown-Lipe Gear Company
Syracuse, New York

The Timken-Detroit Axle Company is glad to welcome, in the "Six Wheeler" of The Six Wheel Company, another new member of the motor-coach family.

THE TIMKEN-DETROIT
AXLE COMPANY
Detroit, Michigan

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TIMKEN AXLES

MIDLAND

The Largest Producer of Automotive Frames in the World

Axle housings
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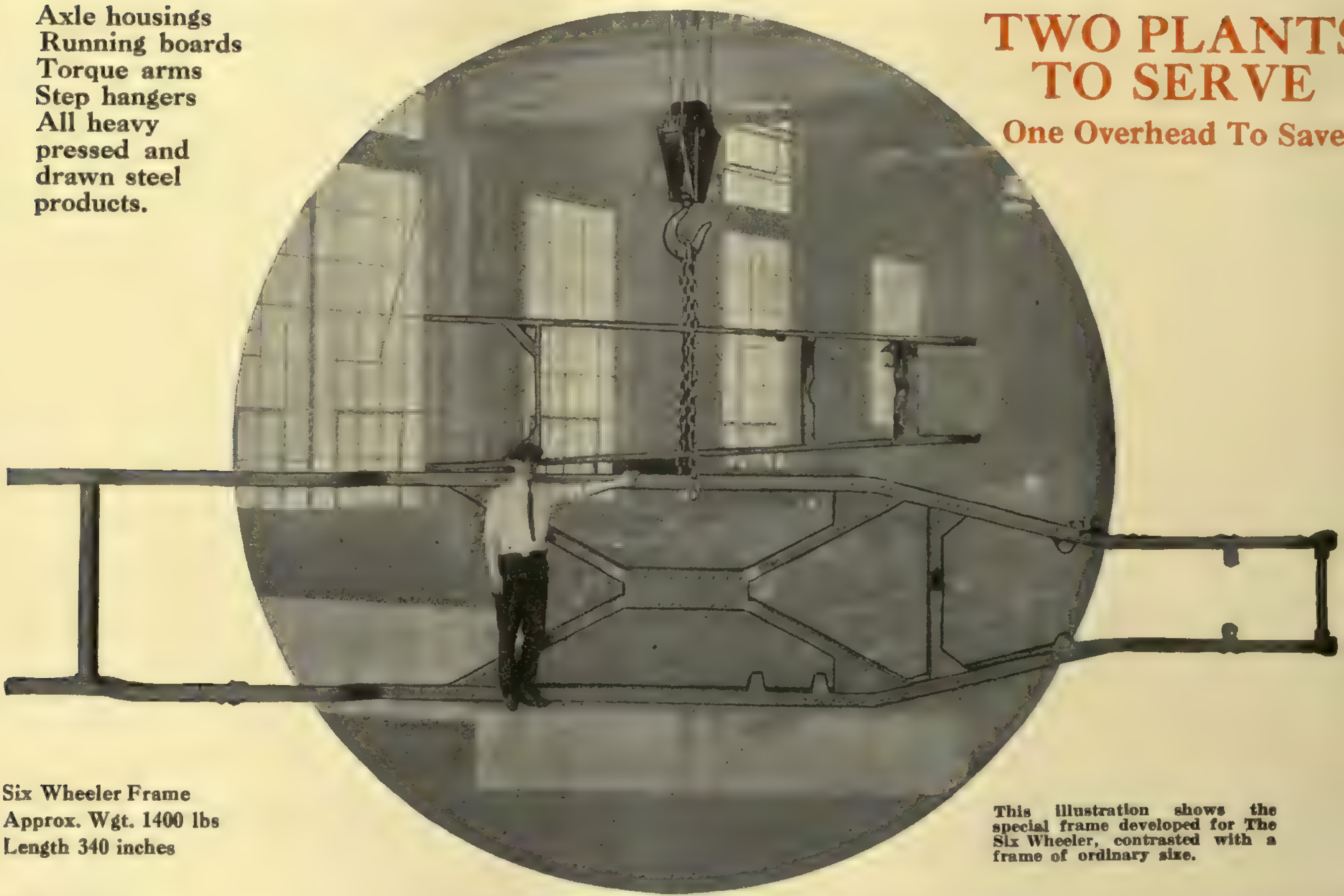
Torque arms
Step hangers
All heavy pressed and drawn steel products.

TWO PLANT
TO SERVE

One Overhead To Save



Six Wheeler Frame
Approx. Wgt. 1400 lbs
Length 340 inches

This illustration shows the special frame developed for The Six Wheeler, contrasted with a frame of ordinary size.

THE two plants of the Midland Steel Products Company are geographically situated for the greatest possible advantage to the automotive industry—Detroit Pressed Steel Division at Detroit and Parish & Bingham Division at Cleveland. No other automotove frame manufacturer offers this twofold, two-plant service.

The three apparent service-advantages are:

(1) Two reliable, immediate and adequate sources of frame supply;
(2) Lowest possible prices, based upon the large volume production, high purchasing power, low freights and low overhead;
(3) Economical, quick, short-haul deliveries, in many cases direct to plant via motor truck.

The equipment and tools of both plants are being made interchangeable to doubly insure unimpaired delivery.

Put your frame requirements up to the largest producer.

THE MIDLAND STEEL PRODUCTS CO.

Parish & Bingham Div.
Cleveland, O.

Detroit Pressed Steel Div.
Detroit, Mich.

Modine Radiators

Best for Bus Service.
Naturally—
They're on the Six wheeler

Modine Radiators are Six Wheeler Equipment for the same reasons that they have been the equipment of leading motor vehicles and automotive machinery for many years—

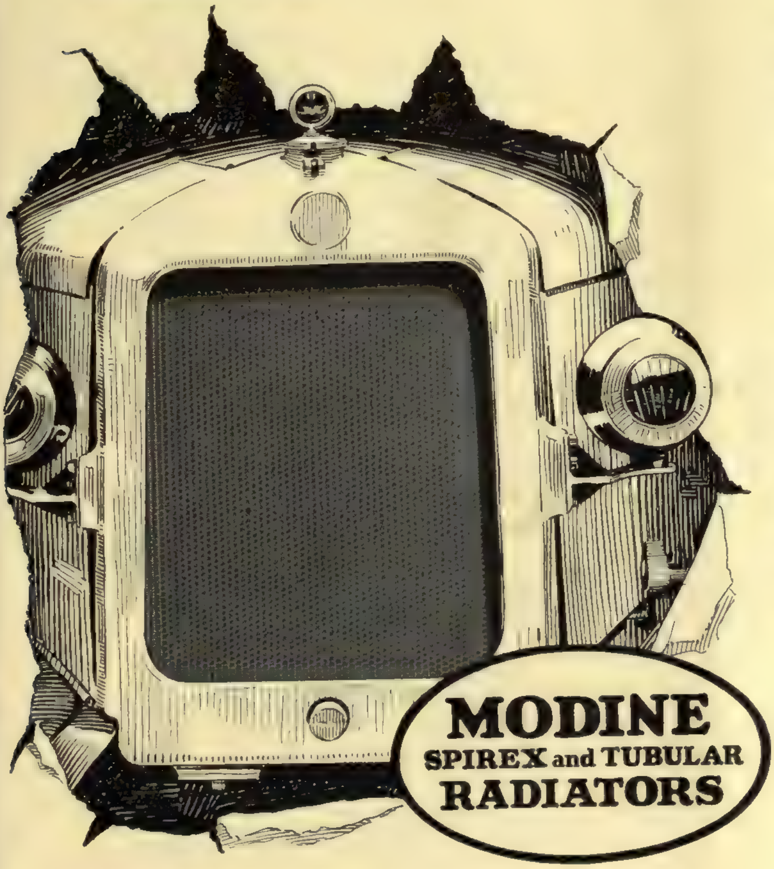
The Modine principle of air control maintains the coldest air against the hot walls of the water channels resulting in the greatest possible rate of heat dissipation.

Modine Radiators have greater cooling capacity per pound of core material than any other construction.

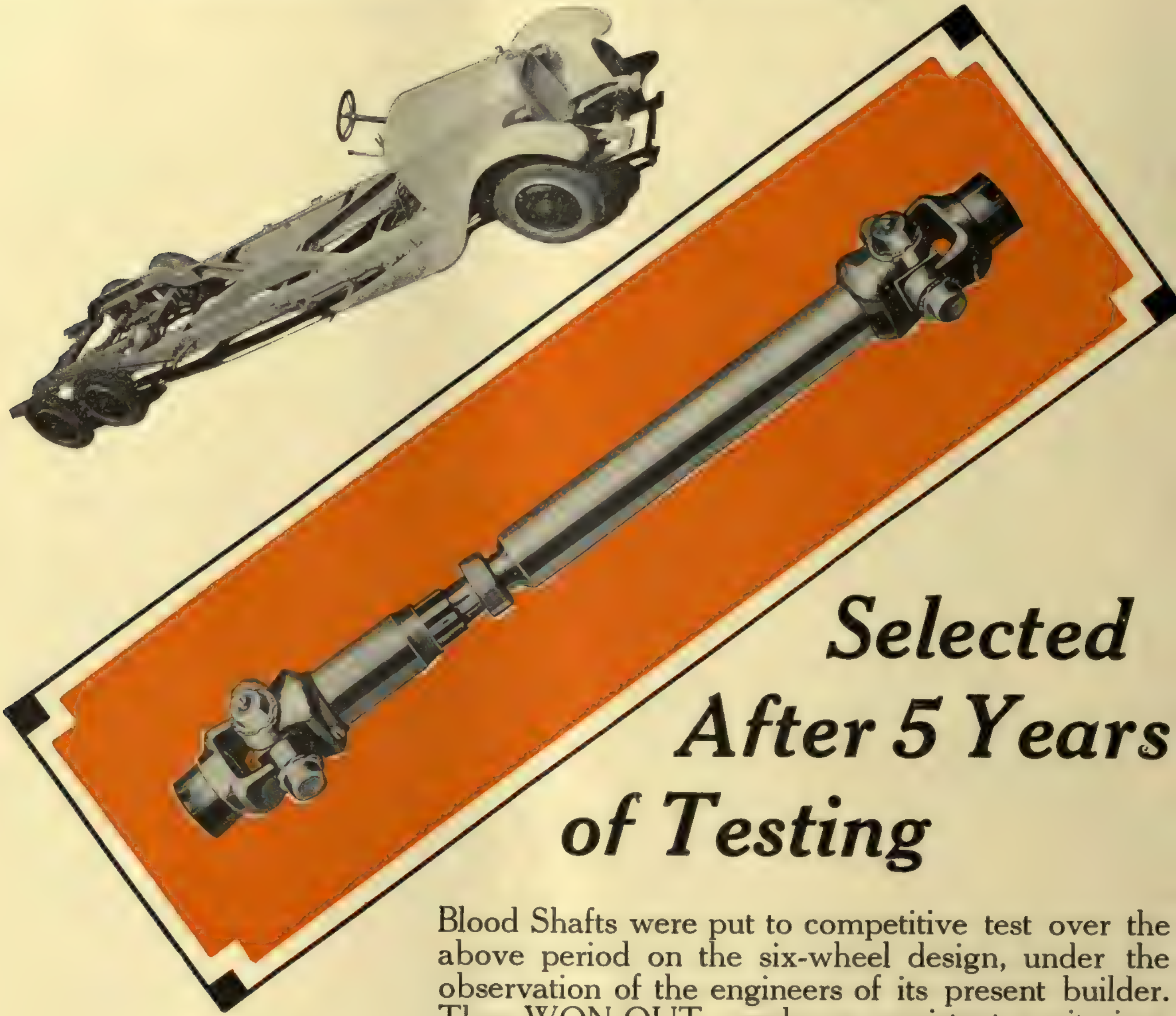
Extra large water channels—one-piece channel construction—extra heavy copper stock—3/16 inch solid metal face, are some of the factors for Modine's unequaled strength and durability.

Write for information.

Modine Manufacturing Co.
Racine, Wis.



Blood-Brothers Propeller Shafts



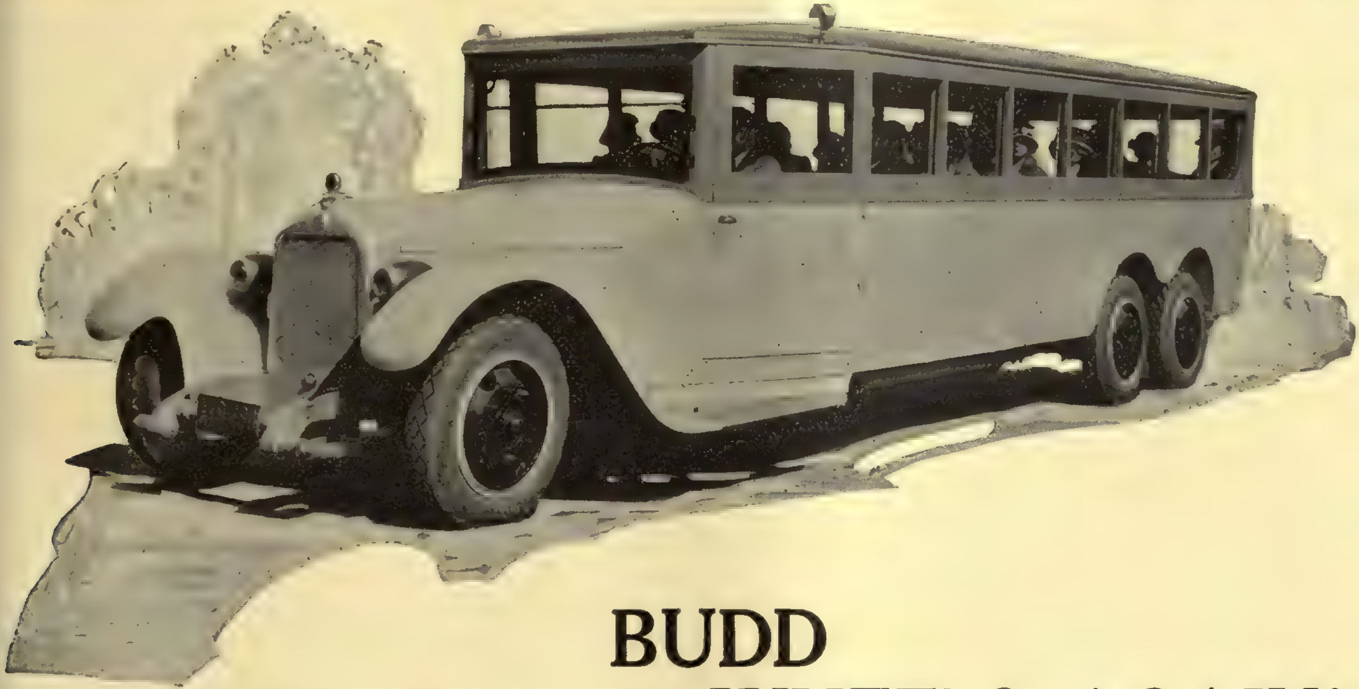
Selected After 5 Years of Testing

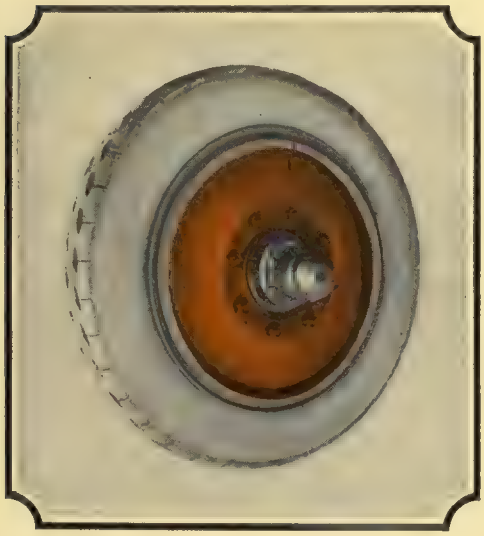
Blood Shafts were put to competitive test over the above period on the six-wheel design, under the observation of the engineers of its present builder. They WON OUT purely on consistent meritorious performance.

Blood-Brothers Shafts have earned their place on the "Six Wheeler" because they ALONE have demonstrated ability to fulfill all requirements.

BLOOD-BROTHERS MACHINE CO.

ALLEGAN **Pioneer Builders of Universal Joints** **MICHIGAN**





BUDD WHEELS AGAIN!

for the SIX WHEELER

The SIX WHEELERS choice of Budd-Michelin disc wheels on which to ride in its initial scrutinizing journey of appraisal before the public brings out more pointedly the already established position of this wheel as the outstanding bus wheel of America.

Although standing in a new arrangement with respect to the chassis, it nevertheless is the same sturdy, dependable, quickly changeable Budd-Michelin, brother of the thousands which in past years have carried the bulk of bus travel. The Budd-Michelin wheel is the common denominator of the bus industry. A common coin of known worth, passing at face value on all highways and may be seen within the hour passing almost every crossroad in the country.

Seven identical interchangeable wheels to the bus, backed by seventy service stations scattered at important points over the country. The SIX WHEELER starts its life with a birthright heritage and claim to immediate and complete attention at any of these seventy points. The new bus is shod for any work future may demand.

Budd Wheel Company
Philadelphia, Pa.

BUDD WHEELS

YOU can do no more to insure the satisfaction of your patrons than to equip your buses with Goodyear Cords.

These big, buoyant, easy-riding tires absorb the shocks and jolts of the roughest going.

Their powerful, tractive All-Weather Tread takes a sure, safe, slipless hold, making for security and on-time travel.

Their rugged strength guarantees trouble-free running and schedules kept to the dot.

Just as these qualities earn the patronage and good will of the passenger, they result in earning power and economy for you as an operator.

Goodyear Cord cushioning protects the engine and chassis. Goodyear All-Weather traction makes the most of fuel and prevents engine strain. Goodyear Cord strength gives you maximum mileage at low cost per tire mile.

Goodyear Means Good Wear

GOODYEAR

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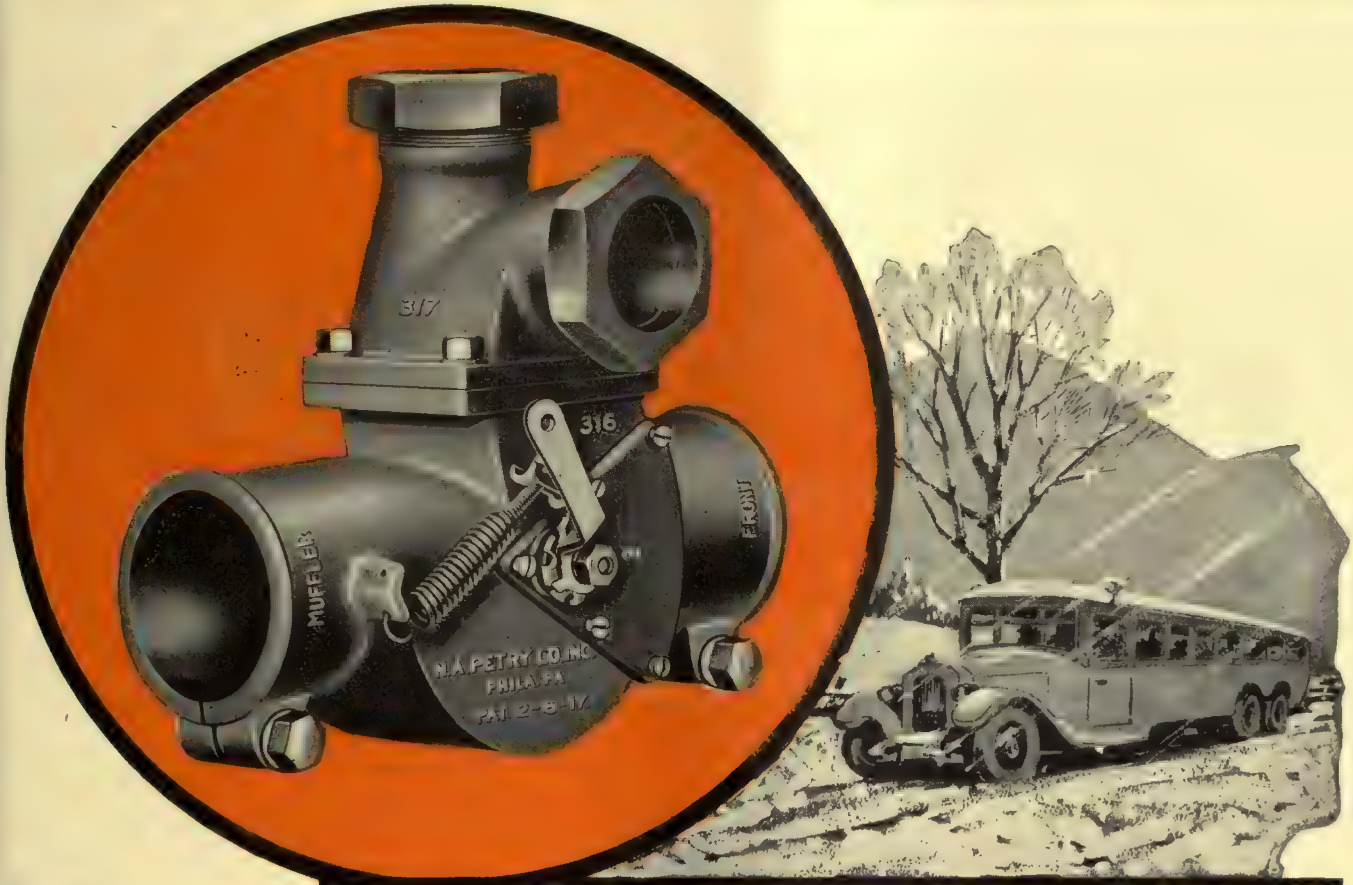
Goodyear makes the type of tire for every hauling condition—Cords, Pneumatic Cushions and Heavy Duty Cushions with the famous All-Weather Tread, and smooth-surfaced solids, also. Goodyear Truck Tire Service Station Dealers everywhere give standard Goodyear Service to bring out of the tires every mile built into them at the factory



**No. 316
Standard Equipment
on the
Six Wheeler**

PETRY HEATING Valve

The Heart of Successful

BUS HEATING

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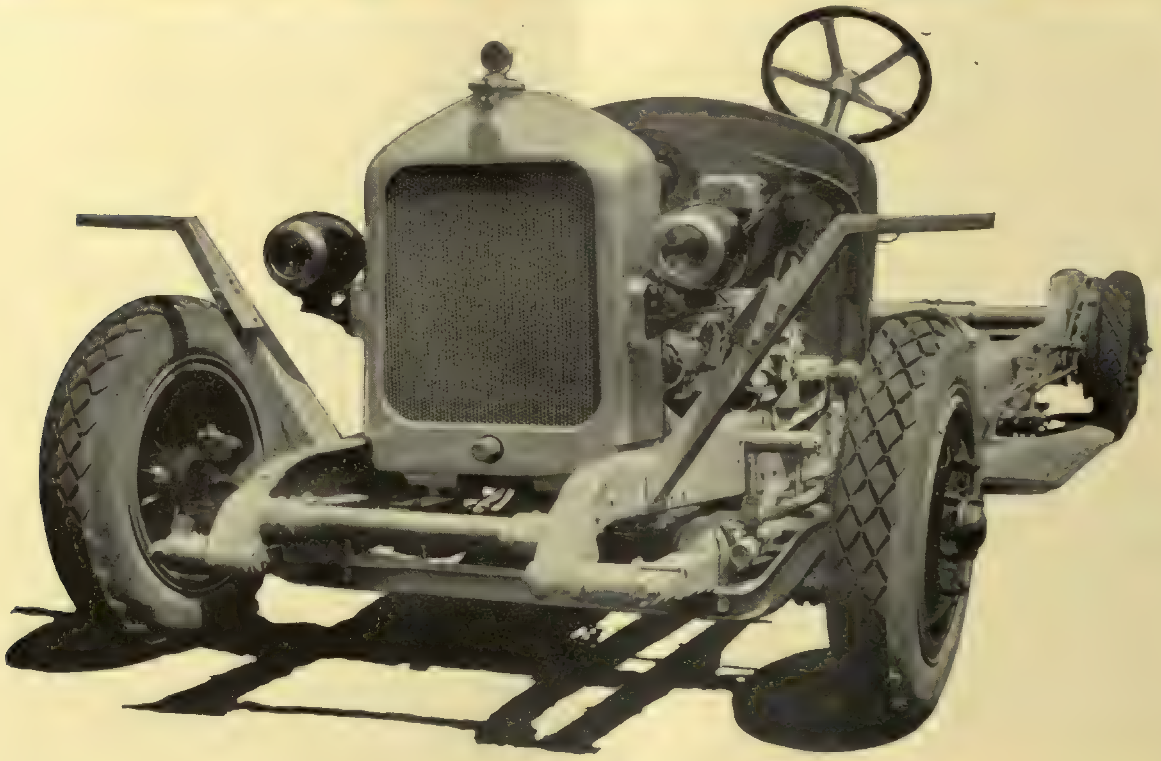


Selected to insure the perfect riding qualities of

THE SIX WHEELER

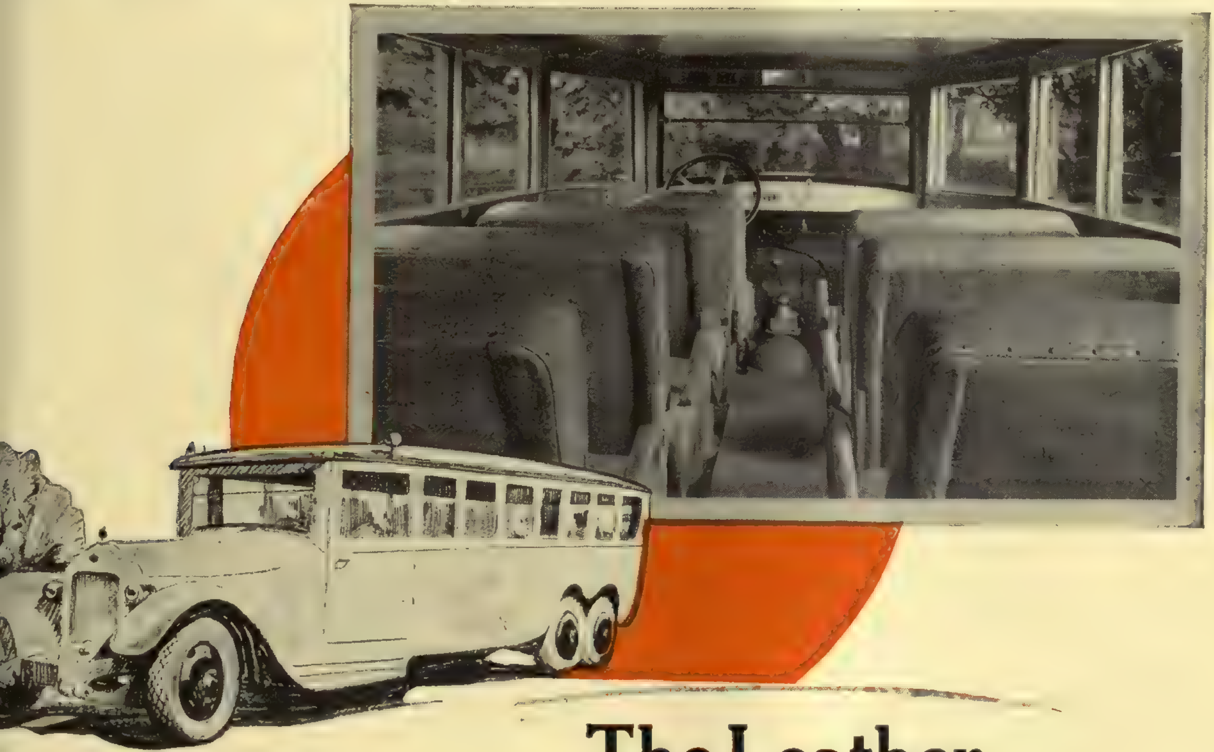
SHELDON
SPRINGS

WHEN the Six Wheel Company considered the question of easy-riding quality, they naturally selected Sheldon Springs.

For in Sheldon Springs they found resiliency combined with strength—springs made by specialists who have devoted their lives to this craft.

Sheldon builds exactly the right type of spring for every type of automotive vehicle engineered to the job.

SHELDON AXLE & SPRING CO.
Wilkes-Barre, Pa.



The Leather that Lasts the Longest

The Stengel family have been Tanners and Manufacturers of Upholstery Leather for over 100 years and are still at it, which is proof of their reliability.

The six-wheel models are upholstered throughout with George Stengel, Incorporated, Genuine Leather.

There is nothing that can take the place of LEATHER. It is durable, sanitary and retains its good appearance.

Prices and samples cheerfully submitted.

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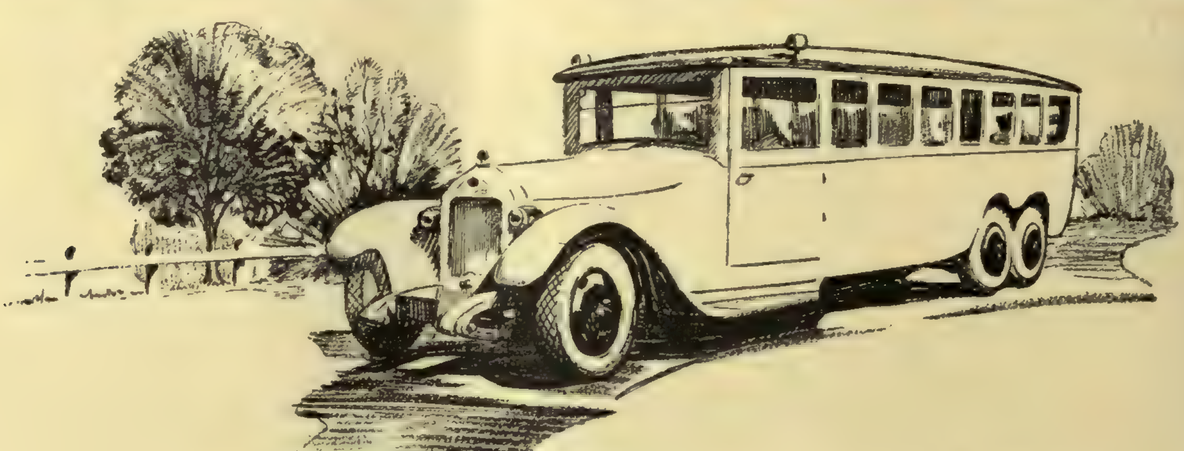

Eisemann Magneto

for the

SIX WHEELER

Selected for Reliability and uninterrupted service

In the choice of an ignition system for the SIX WHEELER, a careful study revealed that positive dependability ranked first in importance among the factors to be considered.

Ignition entirely independent of storage battery and lighting system was deemed advisable and the problem was narrowed to a test and appraisal of the various makes of high tension magnetos.

The selection of Eisemann followed. Simple design, rugged construction, excellent workmanship, first quality materials used throughout, progressively improved from year to year, although unchanged in basic design—it insures continuous, uninterrupted operation.

EISEMANN

EISEMANN MAGNETO CORPORATION
165 Broadway, N. Y.
DETROIT CHICAGO SAN FRANCISCO

Ngugwala

This word means to the Kaffir what "The Back Room" used to mean in American Life.

In the ngugwala the natives gather to smoke, drink native beer and boast.

Argument waxes high and word quarrels are the rule—but just the moment that one is foolish enough to resort to physical fighting, out he goes on his ear—for keeps. There's always a limit to endurance of any kind—even to the chatter from misapplied carbon brushes.

Just prior to this limit we request that you notify a Morganite engineer, so that he'll be on the job to restore calm with a brush that won't talk back.

Morganite Brush Co., Inc.

Main Office and Factory:
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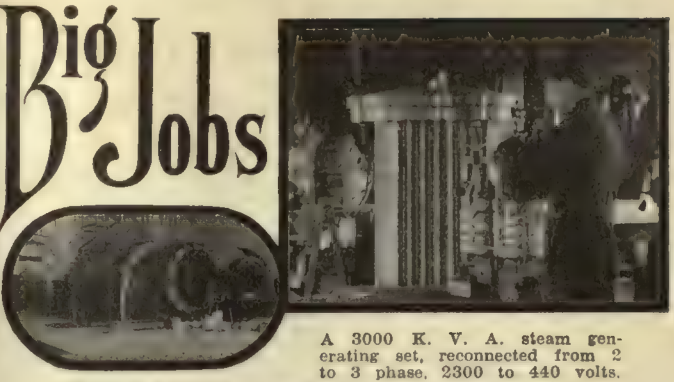

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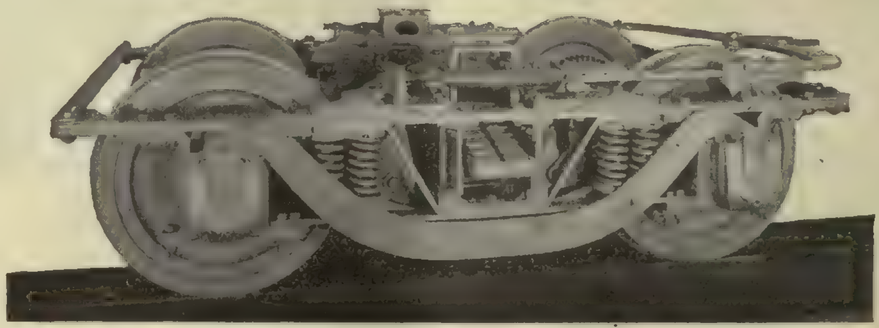

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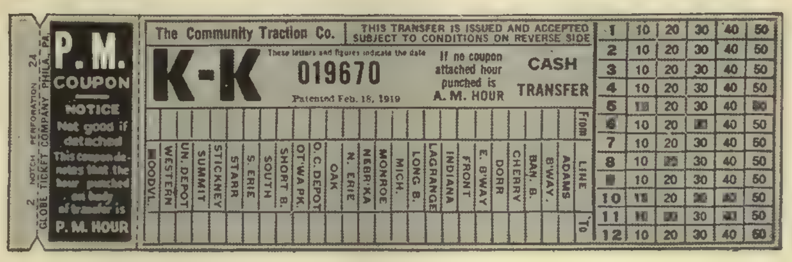

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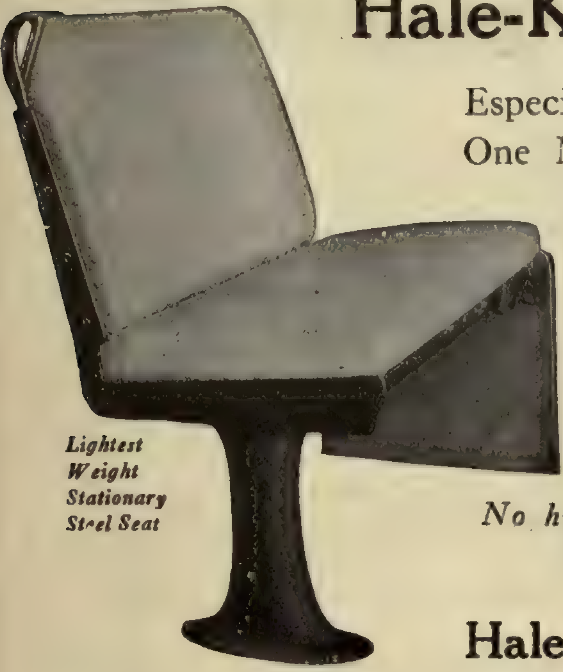

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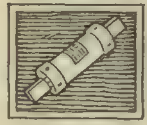

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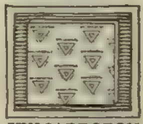

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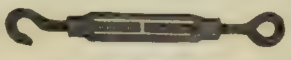

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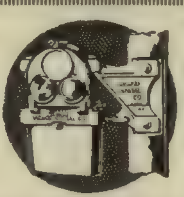

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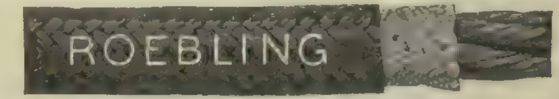

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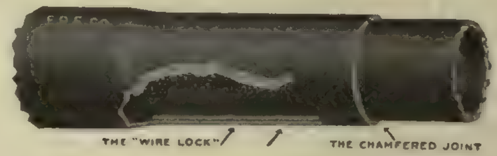

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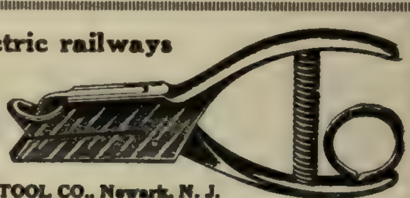

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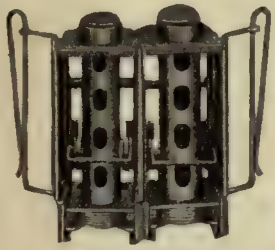

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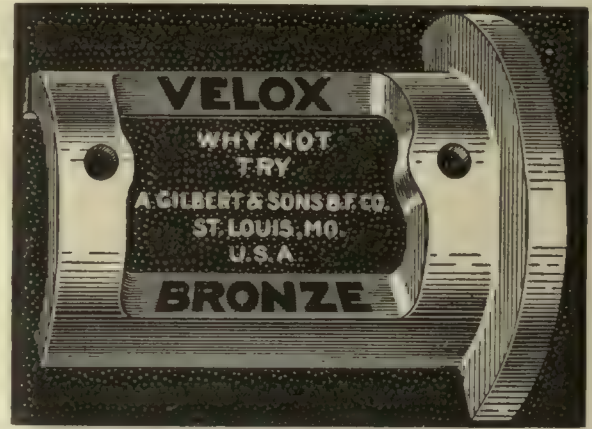
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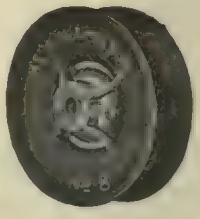

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Successful street railway operator wishes to take charge of promising street railway, capable of being developed by careful management. Willing to invest $50,000 in business. BO-725, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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These proposals will be opened on **August 21, 1924, at 11:00 A.M.**, at which time consideration will be given to all bids submitted.

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Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

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Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

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Timken-Detroit Axle Co.

Axles
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Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
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International Register Co., The

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National Carbon Co.

Barges, Steel
American Bridge Co.

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General Electric Co.
Gilbert & Sons B. F. Co., A.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

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Baldwin Locomotive Works
Stucki Co., A.

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Brill Co., The J. G.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

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Babcock & Wilcox Co.

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Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

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Johns-Pratt Co.

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Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

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National Ry. Appliance Co
Westinghouse Tr. Br. Co.

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Amer. Br. Shoe & Fdy. Co.
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Brill Co., The J. G.
St. Louis Car Co.

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Bemis Car Truck Co.
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General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

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General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
National Carbon Co.
Stackpole Carbon Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

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National Carbon Co.
U. S. Graphite Co.

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Ingersoll-Rand Co.

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International Motor Co.
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St. Louis Car Co.

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Brill Co., The J. G.
St. Louis Car Co.

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Kuhlman Car Co., G. C.
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Wood Co., Chas. N.

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Archbold-Brady Co.

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Elec. Ry. Improvement Co.
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American Engineering Wks.

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Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
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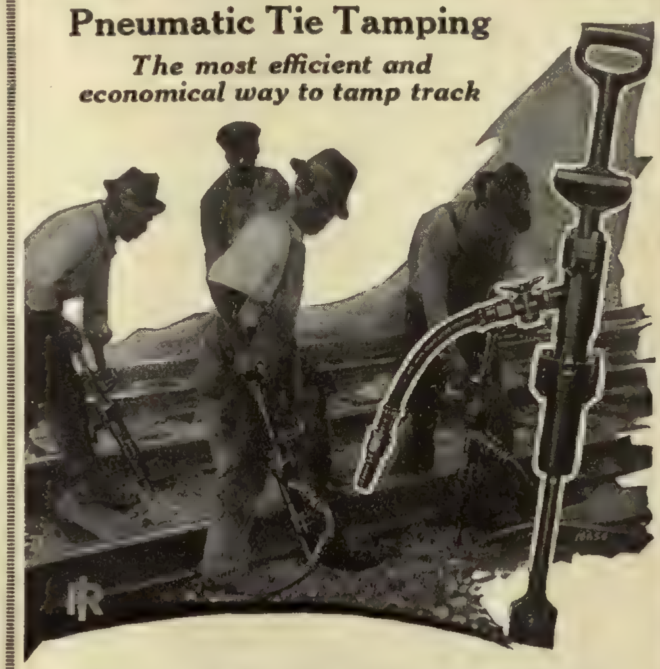

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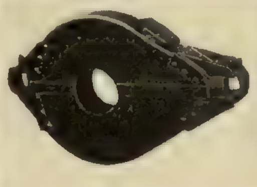

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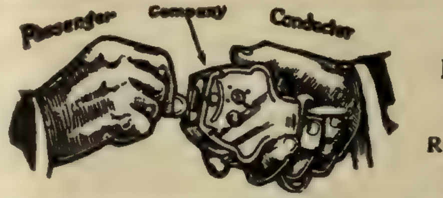

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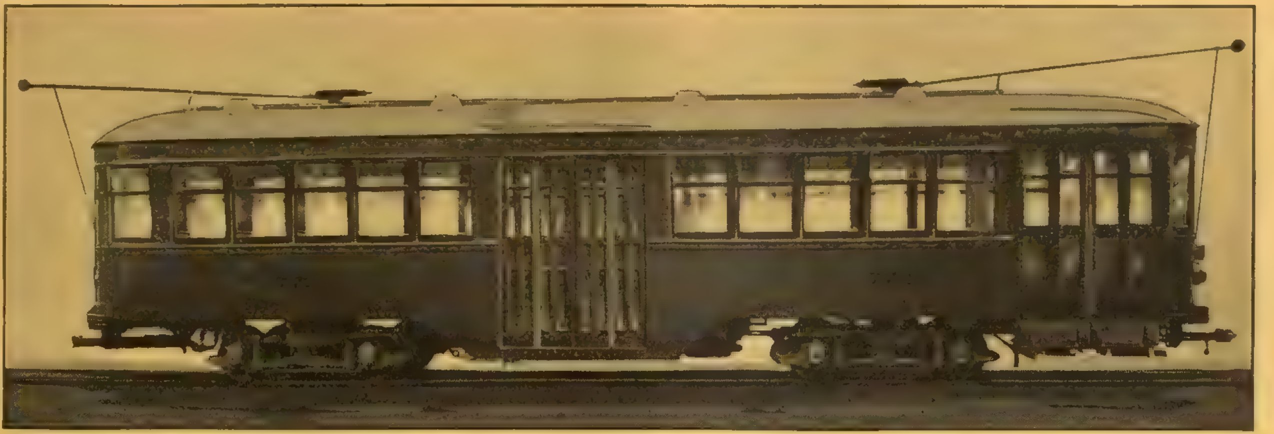

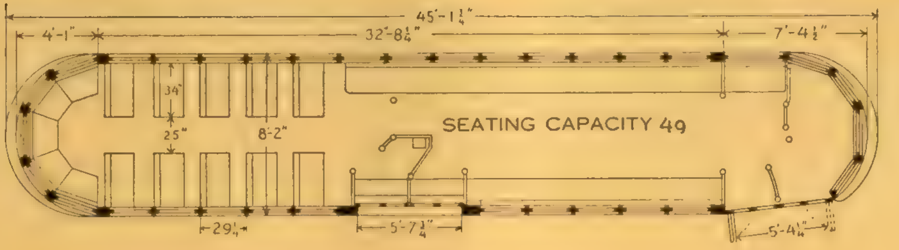

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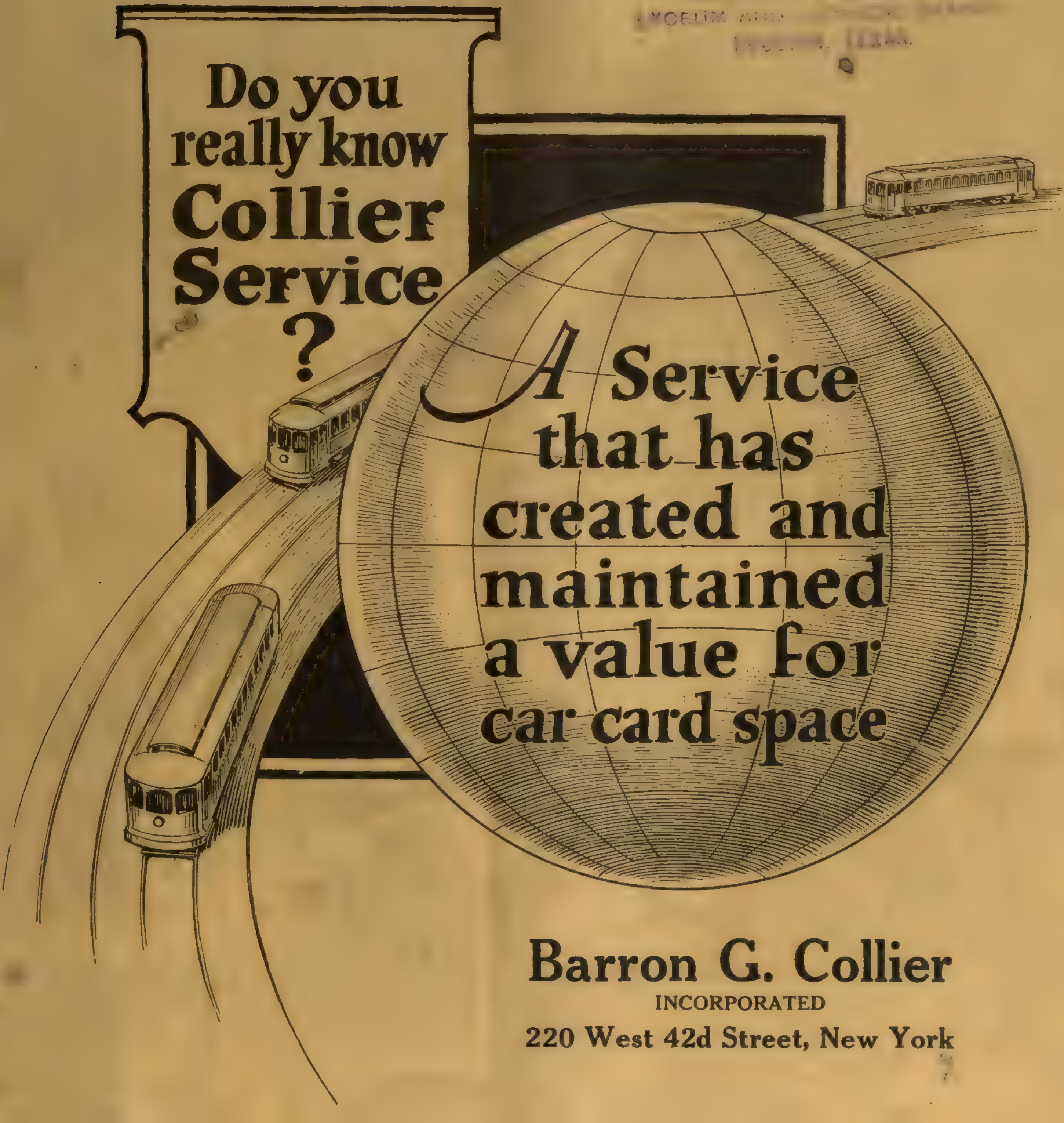

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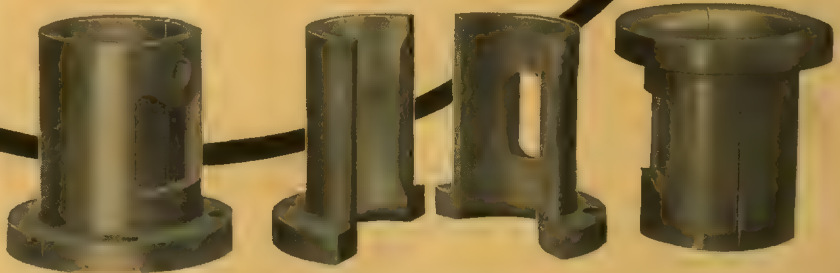

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Vol. 64, No. 7 New York, August 16, 1924 *Pages* 225-266

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

A Big Dividend

QUESTIONED as to what features of ELECTRIC RAILWAY JOURNAL attracted his attention and the order in which he read its contents, the master mechanic of a well-known railway replied:

"First I turn over the advertising pages carefully to see if any new product is shown which would be applicable in my department. Then I read the Maintenance Notes for new methods of doing the old jobs. After these have been read and marked for future reference, I turn to the feature articles and read those of interest to me.

"Why, just last month I read of a new process of making destination signs which had proved successful on a property similar to ours. After preliminary tests we adopted the process. Now we make these signs at the rate of 100 in 21½ man-hours, when formerly it took 116 man-hours to make the same number. I feel that this one article paid our subscriptions to the JOURNAL for many years."

This is just one example of how the JOURNAL serves the men in the industry through the publication of articles telling of worth-while practical methods for doing things — a direct application of the modernization program that is so rapidly revolutionizing the electric railway industry.

Number of Copies Printed, 7,075

Advertising Index—Alphabetical, 56; Classified, 52, 54; Searchlight Section, 51

Let's stop looking poor

This Journal on July 5 urged, editorially, "Let's stop talking poor." We endorse the editorial but propose a further step. Let's stop **looking** poor—let's look prosperous.

And what looks like poverty more than run-down track? What looks more prosperous than good-looking, smooth-riding rail? Good track not only looks prosperous — it helps bring prosperity.

A well kept track cuts down rolling stock maintenance, keeps down expensive track maintenance, builds good will by permitting safe, speedy service with greatest comfort and least noise.

Keep your track in good shape by means of the proven welding and grinding equipment we offer.

It is described in bulletins, yours on request

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:
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Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

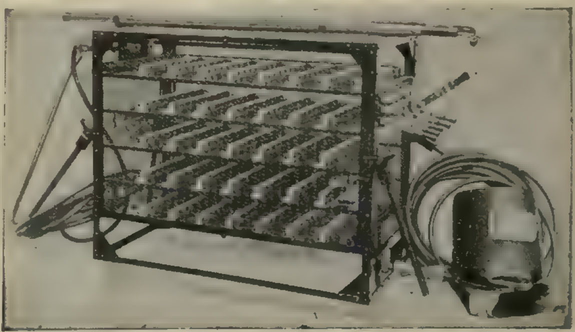
(266)

"Reciprocating" Track Grinder

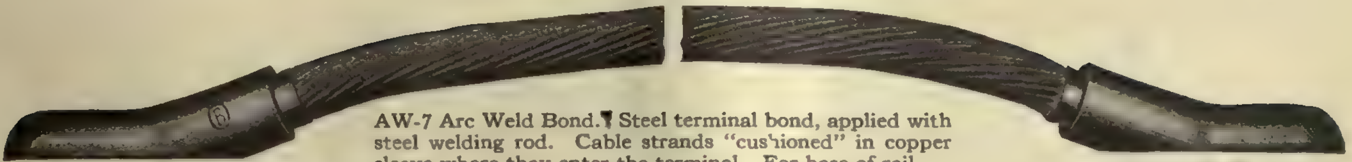
"Universal" Rotary Track Grinder

"Atlas" Rail Grinder

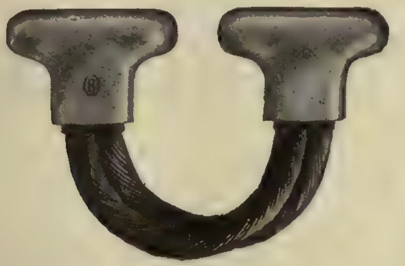
"Hercules" Swing Frame Rail Grinder



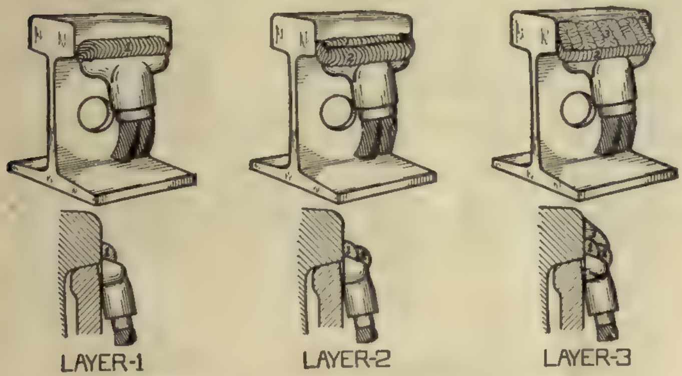
"Ajax" Electric Arc Welder



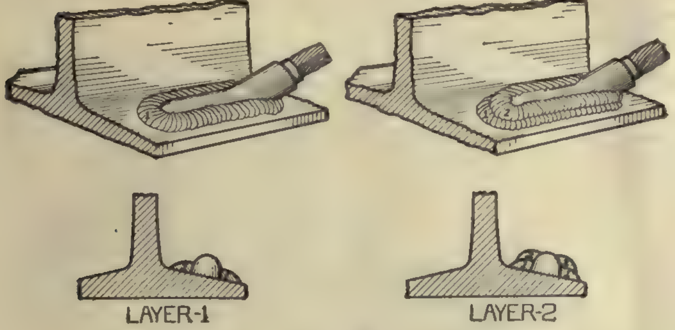
AW-7 Arc Weld Bond. Steel terminal bond, applied with steel welding rod. Cable strands "cushioned" in copper sleeve where they enter the terminal. For base of rail.



AW-8 Arc Weld Bond. Similar to AW-7 except for application to the ball of the rail. Like in AW-7, strands are welded into steel terminal.



The weld on an AW-8 Bond is accomplished in three layers, as illustrated. The edgewise views show how the wide angle between the terminal and the welding face of the rail, makes certain that the weld starts well down in the angle. The 2nd and 3rd layers add mechanical strength and increase conducting section. AW-8 Bonds can be applied without disturbing but a small section of paving.



The long terminal on the AW-7 base-of-rail Bond also forms a wide angle with the base of the rail. Here, 2 layers of welding along both sides and around the end of the steel terminal complete a low resistance, high strength joint. The wide angle welding scarf, on web side of terminal, makes it easy to hold the welding rod in position for welding—a proposition that is somewhat awkward with some bonds.

Two Essentials for Bonding

The Ohio Brass Company recognizes that the most satisfactory bonding must result from two essential things—(1), materials and bond terminal design that facilitate and make welding complete, and (2), a reasonable amount of skill on the part of the welding operator.

To bring about this combination O-B effort is directed first towards producing the bonds and materials to facilitate welding. The illustrations here illustrate how the AW (Arc Weld) Bonds accomplish this purpose.

Second, to help the welding operator develop skill, there is an O-B Specialist available to help any interested property in applying the latest welding practice. In addition, literature on arc welding is available—free for your asking. A large, illustrated, instruction card, suitable for posting around the welders' headquarters and a complete illustrated booklet on the subject of arc welding, our publication No. 502, should be in your hands. Write for them.

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

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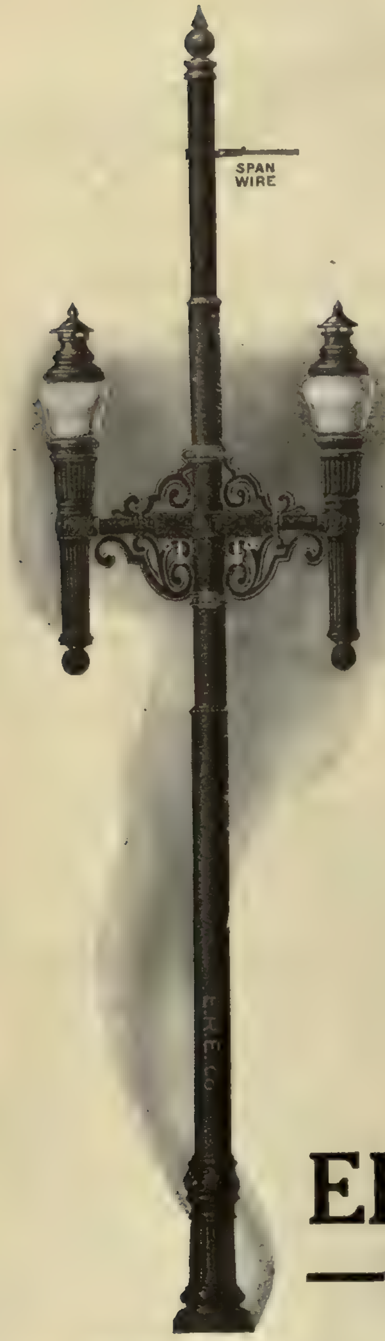

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ELRECO Combination Railway and Lighting Poles help the street railway, in the first place, by reducing its investment in span-wire poles ONE HALF.

Help the lighting company by enabling it to share the use of these poles with the traction company.

Help the municipality by clearing the streets of the usual jungle of poles, lighting standards and wires—and greatly improving the appearance of the streets. A more efficient lighting system is assured also.

ELRECO Poles are the most adaptable steel poles made for joint railway and lighting service. No other form, style or shape of pole offers so much for the money invested.

Ask us to prove it!

The Electric Railway Equipment Co.
Cincinnati, Ohio
New York Office: 30 Church Street

ELRECO
—POLES—

Using Renewal Twin Ties on Old Steel Tie Concrete Foundation

As much as 80% of your track investment is below the base of the rail

THE methods of renewing rail and paving on a Steel Tie-concrete foundation, developed over the past two years and now being applied on a five-mile job, indicate the possibility of a 100 per cent salvage value of the foundation below the base of the rail.

Details and costs are now available which so radically affect the economies of paved track construction that you should have them before going ahead with your plans for any mid-season paved work.

Write today for literature and price for Twin Ties at your material yard

THE INTERNATIONAL STEEL TIE COMPANY
CLEVELAND, OHIO

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This stamp on the butt of every pole identifies and guarantees it as National Pole quality.

Western Red Cedar

Light, Durable and Strong
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Northern White Cedar

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Proper treatment of cedar poles requires knowledge, skill in handling, proper facilities.

To meet the demands for cedar poles properly butt treated to *insure* long life and strength, the National Pole Company operates four of the largest and most efficient treating plants in this country. An organization with years of experience in this work, accurate control of the most advanced methods, resources far greater than any other organization in the cedar pole industry, all combine to give the maximum service to users of poles.

The National Pole Company brand mark on each pole identifies and guarantees every pole. Back of it stands the guarantee of this organization, assuring every user that every National pole is the highest quality timber, properly treated.

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etc.—etc.

New cars for the—

Ohio Valley Electric Railway Co.

IT'S a mark of distinction—an evidence of quality—and an indication of efficient management—to have Keystone Equipment on railway rolling stock. These new cars of the Ohio Valley, are only one notable example of many installations.

Keystone Car Equipment—time-tried, dependable enduring, is illustrated and described in detail in the big ESSCO Catalog No. 7. Consult your copy.

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Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

Grade 4 and grade 5 ties recently produced for a large Class I Railroad on a service contract for its 1924 tie requirements.

PROOF! *Not Promises*

International does not promise quality; by the thoroughness of its methods it assures it. That's sound business—for mere claims of quality cannot weigh against Proof of Quality—and ***International*** does present Proof that cannot be denied.

Every ***International*** Tie is permanently marked with our monogramed dating nail as assurance to you that the timber is sound, the grade accurate, the seasoning thorough and the treatment correct.

International stands squarely behind every ***International*** Tie. It does not relinquish its interest in its ties after delivery—on the contrary it wants the name ***International*** Ties in your yards, on your right of way and in your track.

The name International lives with the ties. It is your security.

International Creosoting & Construction Co.
General Office—Galveston, Texas
Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

International

Standard Specification Ties

Safer?

Absolutely so because the non-adjustable reserve cushion is a permanent feature of all

NATIONAL PNEUMATIC DOOR ENGINES

When doors are closing, this *reserve cushion* automatically retards and almost stops the door, four or five inches from the post. Then it finishes the closing stroke — *gently*. Passengers won't get hands or clothing caught, when such a thoroughly perfected device is used. It's non-adjustable—i. e. it's set right at the factory and needs no further adjusting.

Perfection of every detail is the National Pneumatic motto. That's the reason for the consistent superiority of all National Pneumatic Devices.

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***Principal Office:* 50 Church Street, New York**
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Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.

Bring Mrs. Brown to town *in* ......

"From a service standpoint to the public, both for comfort and regularity of schedule, you cannot beat the Mack. The all-around good service makes the Mack stand out above all other makes of chassis as our present day all steel double truck electric car stands out over the old time mule car."

INTERCITY TERMINAL RAILWAY CO.
North Little Rock, Ark.

Mrs. Brown is typical of the hundreds who live in an outlying growing community, not reached by railway service.

Mrs. Brown must come to town to do her shopping. Mr. Brown must reach the station or his place of business. The little Browns must be brought to school.

What is the answer? Expensive track and overhead extension? Enlargement of the power station?

No.

Railways are everywhere meeting this problem of adding to their earnings by reaching out for these fares with the modern bus.

Experience proves that the Mack bus gives the Brown family a degree of riding comfort that invites many additional trips, at the same time assuring the company of economies in daily operating and maintenance costs.

Mrs. Brown likes the ease of riding due to the long, light springs that float in cushions of resilient rubber, an exclusive Mack feature. She enters the Mack bus without effort, for the body is only one step from the ground. And she enjoys a feeling of safety, she also knows that the bus will be on time. She and her neighbors promptly become steady patrons and loyal boosters.

Back of all this is Mack design and construction, the work and study of Mack bus engineers. The Mack bus is *all bus* — from bumper to tail light. Chassis, motor, wide front axle and dual reduction rear axle, transmission — every factor is planned to contribute to efficiency of bus operation.

Let Mack bus men work with you on your transportation problems and give you the benefit of their experience.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR CO.
25 Broadway, New York City
Builders of City and Sedan Type Buses

Eighty-three direct Mack factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus

Sedan Type Bus
for Interurban Service

Sixty-seven per cent of Mack Bus deliveries this year have been to street railway companies.

Performance counts!

Beat the Traffic!

The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes.

The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand.

The use of the brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

SPEED up the schedules of your cars through congested districts, where stops are frequent.

Cut down stopping distance with the Westinghouse Variable Load Brake.

By reducing the time ordinarily required for deceleration when the loads are heavy, golden seconds can be saved at every corner. The faster progress which results is translated into higher daily car mileage, increased earning ability, more frequent service and new expressions of satisfaction from those who ride.

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EQUIPMENT
for EVERY CLASS
of
SERVICE

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In New York and Elsewhere!

Fifth Avenue Buses were born and raised in New York. But their pioneer spirit could not be confined to Manhattan Island. Other communities needed them. And Fifth Avenue Buses are meeting the demand.

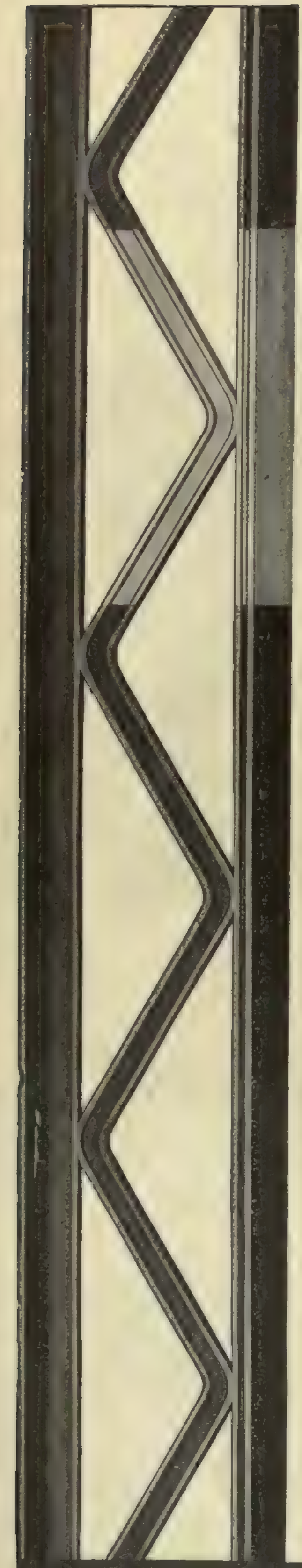
Today you can see Fifth Avenue Buses, both standard Type J one-man units, and the familiar double-deckers, in a dozen or more typical American communities—

Fifth Avenue Buses are meeting transportation conditions satisfactorily everywhere they go. There's a world of meaning in our slogan—

"A Fifth Avenue Transportation System for Every Community"

NEW YORK TRANSPORTATION CO.
New York, N.Y.

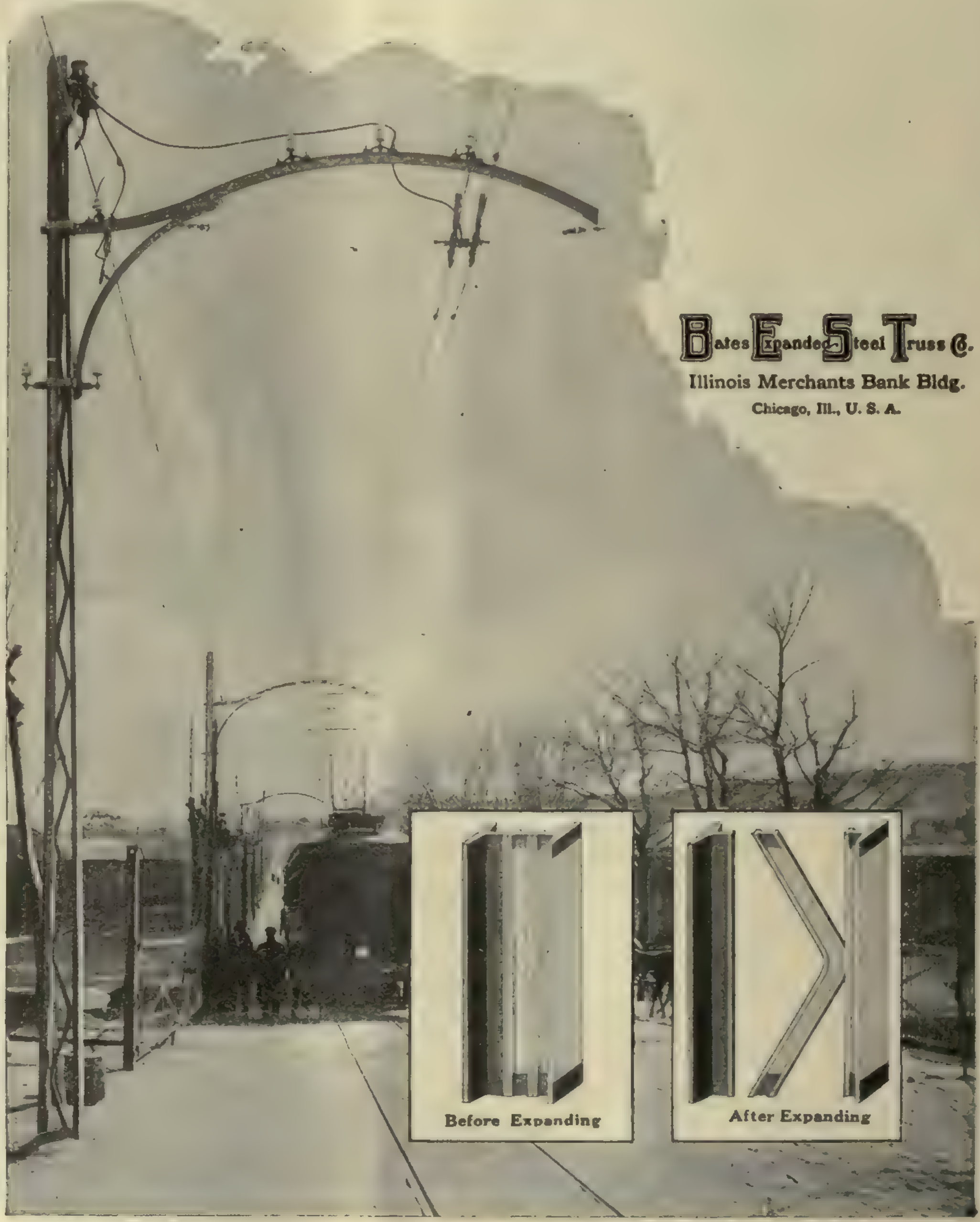
MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA



Bates Poles on Electric Railway in Coruna, Spain

Bates Poles with specially designed trolley supports are used along the right of way of the Compania de Travias de la Coruna at Coruna, Spain.

A perfect truss made from one piece of steel, without rivets, bolts or wheels, Bates Poles have remarkable strength and give sturdy service. Mass production makes them economical in first cost, their simplicity makes them easy of maintenance.



Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

What the check-up tells

Not 'til you come to check the wear on bearings, and the results on gear teeth, do you get the *whole story* on lubrication costs. Anybody can buy and use oil or grease. Its total cost is not in itself so very much. It's the result on the metals themselves that may run up into money.

Galena Lubricants, backed by Galena Service, are proving themselves the really economical ones on hundreds of electric railways throughout the country. No road is too small to receive our most careful attention—no road is too large for us to handle efficiently.

Try Galena—and let the check-up decide whether or not it is worth continuing.

QUALITY-SERVICE-ECONOMY G O S C – GALENA OILS –

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

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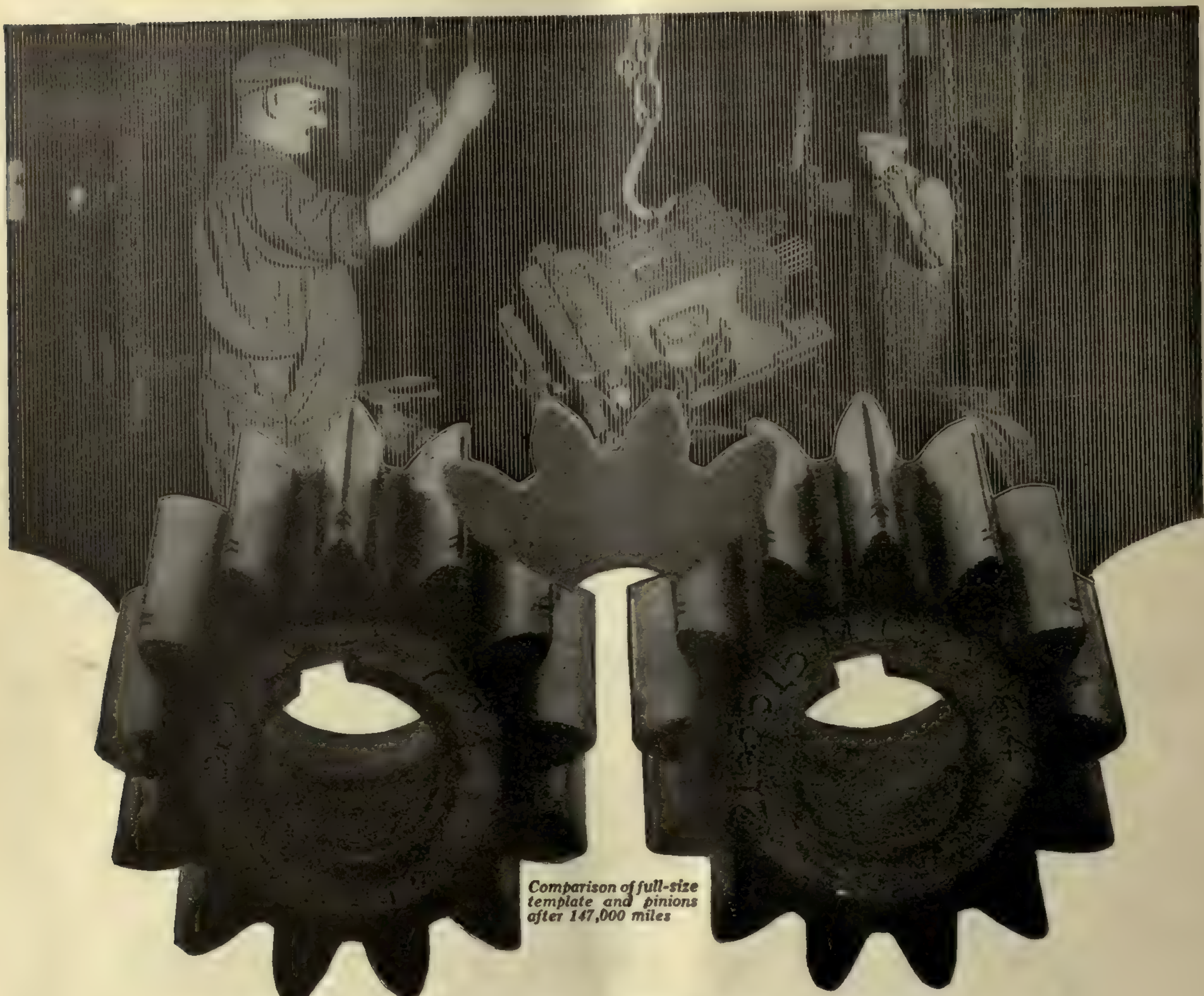

Comparison of full-size template and pinions after 147,000 miles

147,000 Miles

in city service
on GE-264 Motors

and good for as much more

Mileage figures alone are not conclusive evidence of quality in railway gears and pinions. When taken in consideration with all the operating conditions, however, mileage becomes significant.

Here is a case of 13-tooth, 4¼-pitch, Grade M Pinions operating on GE-264 (25-h.p.) Motors in city service. They were inspected after 147,000 miles and found to be only half worn out.

Railway men familiar with the factors that determine gear and pinion mileage will appreciate the significance of such a record.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

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GENERAL ELECTRIC

New York, Saturday, August 16, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and Harry L. Brown, *Editors*

Volume 64
Number 7

There Is Room for Improvement in Bearing Maintenance Practices

ON MANY electric railways the interval between the times that it is necessary to give attention to bearings determines the overhauling and inspection periods for the rolling stock. Long life of bearings is, therefore, most essential. This issue of ELECTRIC RAILWAY JOURNAL contains the first of two survey articles relating to bearing practice. Information has been collected first hand by personal inquiries of the editors as to the methods used in preparing bearings for use before they are machined and refitted to the rolling stock.

The use of bearings consisting of a shell of bronze, iron or steel with a wearing surface of a soft tin or lead base metal is nearly universal in this country. In order to obtain satisfactory service from such bearings, close attention to their preparation is necessary. The three most important essentials are a good grade of babbitt metal, absolute cleanliness and close attention to the temperature at which the metal is worked. A satisfactory bearing can be produced only by a skilled workman using proper methods and suitable equipment.

Regardless of its qualities, babbitt will give but indifferent results unless poured at close to the right temperature. When overheated, babbitt loses part of the constituents essential to long service, and if poured too cold, it cannot produce a bearing of satisfactory texture. The survey shows that not enough attention is being given to this important detail. Less than one-third of the railways visited had melting pots equipped with temperature control. The method most commonly used for determining temperature consists of inserting a pine stick in the hot babbitt. If the stick catches fire the metal is assumed to be hot enough for pouring. While this test is crude enough, there is no test for overheating. Even the "pine-stick" test is seldom made.

Particular attention has been given, in most cases, to the quality of new babbitt metal purchased, but frequently insufficient care is exercised to keep the metal pure. Impurities enter through lack of attention in cleaning out the old babbitt from shells, in keeping the new metal in the pots free from contamination, in using dirty ladles and babbitting jigs and in careless work while tinning the shells. Some master mechanics who have had analyses made of babbitt metal taken from bearings have been surprised to find traces of iron and other metals foreign to the original mixture. For armature bearings, it is folly to attempt to mix new metal with old. An unsatisfactory bearing is sure to result.

Failure of bearings in service should be followed by a careful investigation and analysis of the methods and equipment being used in the babbitting department. Closer attention to the essentials may prevent the trouble and produce substantial savings, to say nothing of greater regularity of service—for in the end that is what counts.

Good Work by All Will Help Pay High Wages

AN EDITORIAL in these columns recently called attention to increases which have taken place in electric railway wages during the past twelve months. If the present high wages are to continue, the only way in which they can be paid is for the men to give the companies the very best and most loyal service within their power. They can help in many ways.

This help need not go so far as to advance the interest due on the bonded indebtedness of the company when its treasury is low, or of purchasing a large block of stock so as to vote into office a popular group of directors, though both of these things have been done by electric railway employees within the last few years. There are less spectacular but equally effective ways of helping the company's finances.

One way is to operate as economically as possible so as to keep down operating expenses. This means care in using power and supplies; care in operating without accidents to persons and property; notifying some responsible officer of the company of leaks which may be noticed in the expenditure and of defects which may be discovered in the equipment, so that they can be corrected promptly; of speeding up the service so that a greater number of car-miles can be operated in the same number of car-hours, etc.

It also means assistance to the company in increasing its gross receipts, as by courteous and attentive treatment of passengers on the car, of being on the lookout for waiting passengers, of standing up for the company and its policies in public and private meetings and at the polls if necessary, in helping to impress the public with the idea that an efficient and enterprising electric railway is an asset to every community and that the only way in which such an asset can be had is by fair treatment of it by the public.

The suggestions just made apply primarily to the platform man, but it is obvious that good work from the men in the shops, power station, construction force and offices is equally necessary. It should be a case of all pull together.

This applies also to the executive force, for it should be recognized that nothing is so effective in good team

This is the issue in August that is devoted essentially to maintenance subjects

work as the cordial co-operation and interest of the management. On a certain property, a platform man on one of the outlying divisions recently remarked that he had been with the company eight years, and during that time he had not seen any of the officials of the company at his division headquarters, with the exception of the master mechanic and the division superintendent. On another property, not far away, the general manager knew by sight practically every one of the 1,800 employees on the property and could call most of them by name. Although a good memory for faces and names is largely a gift, there is no reason why all the men should not at least know the manager by sight and feel that they can talk things over with him when they wish to do so. It is part of his job to have them know him, and his work will be accomplished far better if they are working with him.

Getting the Best Results from Reclaimed Oil

THE familiar quotation from Benjamin Franklin, "He has paid dear, very dear, for his whistle," shows that there has always been a tendency to misapply certain products or practices to uses for which they are not economical. The use of old material or reclaimed material for purposes to which it is not suitable in electric railway maintenance, may cost more in the long run than new material particularly adapted to the use desired.

The work of reclamation is to be commended and should be encouraged, but care should be used in applying the material not to put it to an inferior use or one for which it was not originally intended. In a recent survey article published in ELECTRIC RAILWAY JOURNAL mention was made of the fact that several railways were using reclaimed oil for various purposes. In a communication published in this issue of the JOURNAL it is pointed out that for many of the uses to which reclaimed oil was said to be put the particular type of lubricant was not suitable. Reclaimed oils of straight mineral character can be used for the same purposes as those for which the new oil was initially used, and with equal or even better results, but the benefits of reclamation may be lost through misapplication.

This illustration serves to bring out the point that master mechanics should consider the suitability of any material to be used as well as its initial cost as compared with that of new material. The manufacturers' engineers often spend considerable time and thought determining the particular product that will meet the railways' conditions most satisfactorily. If something unsuitable is substituted troubles and delays may occur that will prove far more expensive than the initial cost of the right material.

Systematic Inspection Pays Handsome Dividends

NO MATTER how good the component parts of electric railway equipment may be when purchased, they cannot continue to function indefinitely without proper inspection and repair. Both of these are important. Continuity of service, the aim of any management, depends on finding the possible failures before they occur and so repairing the parts that the cause leading to a failure is either removed or its effects counteracted so that the part can function successfully.

The efficiency of the car inspection department can be judged directly by the public in the number of failures or delays which occur in service. These are the result of the defects missed due to lack of inspection or improper repair of the parts inspected and found unfit. As a rule failures of this sort, if more or less regular in their occurrence, indicate that the inspection has been slighted, either through inefficiency of the force or through a short-sighted policy of the management in saving money for the moment.

A few illustrations will show that trivial causes may result in serious disruption of the service. In going over the records of one railway, several items appeared as causes of delays that would not have been possible with proper inspection. One of these was the wedging of doors due to worn races. Delays occurred at nearly every stop, so that the car ran considerably behind its schedule. Another delay was caused by a burnt-out lamp in the headlight circuit. This minor failure was allowed to go unnoticed until it was time to turn on the headlight. The result was considerable delay due to replacing the lamp. The two delays in question spoiled a monthly record that otherwise was excellent. They serve as a good example of the value of making sure that the inspection is carried through at the time designated, and that the repairs are carried out immediately when they are found to be necessary.

Clean Cars Increase Riding and Deteriorate Less Rapidly

THE many railways which are now making a special feature of keeping their cars clean and advertising this fact to their patrons report good results from such campaigns. Certainly the cleaner and better-looking cars are kept, the greater will be the attractiveness to car riders.

There still is room for improvement in methods of car cleaning on a large number of railways. If cars are to be kept clean, they should be washed frequently outside. To do this without considerable cost proper washing equipment is needed. One of the most efficient methods that has been used in a large number of shops and is being installed in many of the shops which are giving special attention to car cleaning consists of a washing section with perforated pipes connected to the city water system. Tracks set aside particularly for car cleaning are provided with proper drainage so that the car can be run through the spray from the pipes as many times as needed, while men with brushes clean the windows and woodwork.

Another chance for improvement in cleaning practices is in the interior of the cars. Vacuum cleaning equipment has been used by several electric railways. The principal trouble experienced is that railways have attempted to use for this purpose equipment not particularly well adapted to the needs. There are several vacuum cleaners on the market, however, which have been worked out particularly for installation in shops where such work is done.

Aside from the increased riding and the merchandising value of clean, attractive cars, deterioration usually takes place more slowly. The dirt in corners collects moisture and leads to decay of posts and window framing on wooden cars and to rusting of various parts on steel bodies. By keeping cars clean such parts need less attention to keep them in repair and repainting can be done at less expense. Modernization in this respect will give results well worth the outlay.

Survey of Armature, Axle and Journal Bearing Practice

First Article

An Analysis of Types of Bearings Favored, Methods of Determining Wear and Removal of Bearings, Removing Old Babbitt, Cleaning and Tinning Shells, Babbitt Composition, Mandrels, Pouring the Babbitt—Practices of 20 Electric Railways Disclosed by Personal Visits of Editors Are Summarized

Babbitting Department of the Third Avenue Railway, New York City

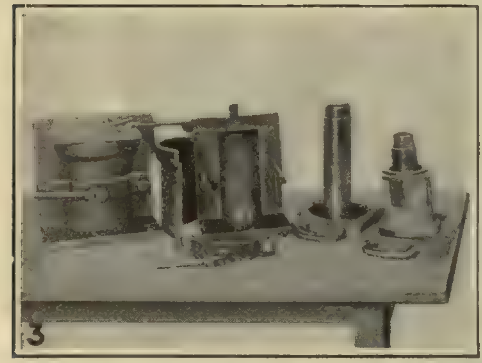
REALIZING that the time between overhaulings of electric cars is governed principally by the life of the various bearings, a special study has been made of the bearing practice on twenty representative electric railways by personal visits of the editors of ELECTRIC RAILWAY JOURNAL. The practices found are in general quite uniform, but of course vary with the different types of equipment used and also with the types of bearings which are operated.

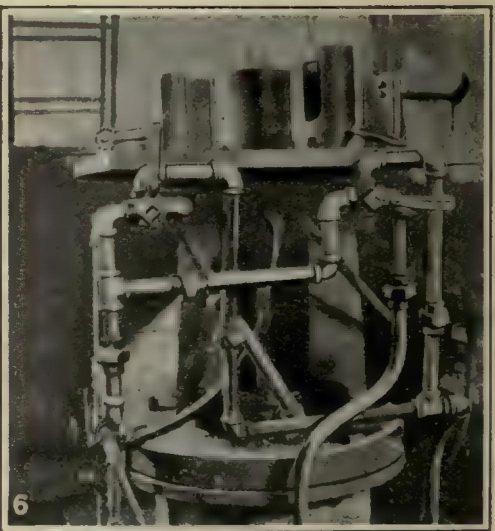
Most of the electric railway properties were found to have three types of bearings in service. These were (1) babbitted cast-iron or malleable-iron shells, (2) babbitted bronze or brass shells, and (3) solid bronze bearings. There is a general tendency away from the use of the babbitt-lined iron bearings, and either babbitt-lined bronze or solid bronze bearings are being substituted for those with iron shells. Of the 20 electric railways from which information was obtained, 12 were using all three types of bearings. Eight companies were using babbitt-lined bronze or solid bronze bearings exclusively. These are the Long Island Railroad; New York Central Railroad; Toronto Transportation Commission; Niagara, St. Catharines & Toronto Railway; Youngstown Municipal Railway, Illinois Traction, Inc., New York, Westchester & Boston Railroad, and the New York, New Haven & Hartford Railroad.

The bearing practice of electric railways is readily divided into five distinct operations: (1) Removal of the bearings from the cars, their gaging for wear and to determine their suitability for rebabbitting in order to return them to service; (2) removal of the old babbitt and preparation of the shells for rebabbitting; (3) where a babbitt lining is used, relining the shells with babbitt; (4) machining the bearings, cutting oil grooves and other work necessary to produce a finished bearing and (5) reinstalling the bearings in cars and making sure that proper fits are obtained. The first three of these operations will be analyzed in this article, and a subsequent article will deal with the machining and fitting of bearings after they have been babbitted.

TESTING MOTORS FOR ARMATURE CLEARANCE

As bearings do not wear uniformly, most electric railways find it necessary to check up the clearance between the armatures and the motor pole faces as a matter of regular inspection. The most common method of determining the clearance is to insert feeler gages of various thickness. Whenever a motor has so small a clearance that the thinnest of the feeler gages is the only one that can be inserted, the car is ordered in and the bearings are replaced. The thickness used for the thinnest gage was found to vary on the railway properties visited from a minimum of 0.02





Representative Babbitting Equipment and Methods Used

No. 1. On the Third Avenue Railway, New York City, all bearings are painted with whiting before tinning, so that the tin will not adhere where it is wanted.

No. 2. A pair of babbitting metal furnaces used in the shops of the United Electric Railways, Providence, R. I.

No. 3. Several types of babbitting jigs used by the Eighth Avenue Railroad, New York, N. Y.

No. 4. Armature-bearing babbitting bench in the Third Avenue Railway shops showing various types of bearings and jigs used.

No. 5. Babbitting jigs used for babbitting truck journal bearings in the shops of the Third Avenue Railway.

No. 6. Molding machine used for solid bearings in the shops of the United Electric Railways, Providence, R. I. A water-cooled arbor projects through an iron table. In operation the arbor is elevated by a manipulation of two three-way valves. The mold is placed over and around it and the babbitt is poured and cooled in about a minute's time.

in., used by the Omaha & Council Bluffs Street Railway, to 0.09375 in. on the Brooklyn-Manhattan Transit Corporation. On the majority of the roads the thinnest gage was approximately $\frac{1}{32}$ in. Nearly all of the railways test for both top and bottom clearance, but the bottom clearance is the only one considered when replacing bearings. In addition to replacement for wear, bearings, of course, are removed when the equipment is overhauled, and in most cases the practice is to replace them with newly fitted ones.

After the bearings have been removed, the wear both inside and outside the shell must be determined and those bearings which are excessively worn and which cannot be rebabbitted with safety must be discarded or scrapped. The Third Avenue Railway and the Brooklyn-Manhattan Transit Corporation use snap gages for determining the wear on the outside of the various types of bearings. As soon as the bearings are removed, they are gaged, and if the snap gage for that particular type passes over the bearing, it is rejected. On some of the smaller railway properties, the suitability of a bearing shell for rebabbitting is judged entirely by looking at the shell and determining its thickness. Of course the inside lining of the shell can be rebabbitted so as to provide a proper fit for the axle, but the outside wear can only be taken up by using shims between the bearing and housing or by building up and remachining the parts which fit together. The various methods used and results obtained will be considered in the second article.

The next operation is that of removing the old babbitt and preparing the shell for rebabbitting. In most railway shops there is a pot with old babbitt and the bearings are dipped in this until the temperature is high enough to melt out the lining. In Toronto the lining is melted out in a special gas furnace so that the metal is run off into molds as soon as it melts, preventing overheating and burning. The removal of babbitt metal by the use of a hammer and chisel has been quite generally discarded, as this not only entails considerable labor, but there is danger of damaging the shell. It is also a difficult matter to chip babbitt from anchor holes and grooves.

Circular Benches Around the Babbitting Pot Make a Convenient Arrangement in the Eastern Division Repair Shop of the Brooklyn-Manhattan Transit Corporation

CLEANING THE SHELLS AN IMPORTANT ELEMENT

After the old babbitt has been removed, the next step is to clean the shells of all dirt, sand, scale, rust, oil and grease. Oil and grease are quite generally removed by burning or by dipping in the babbitt pot. Sand, scale and rust are most frequently removed with a wire brush or a stiff bristle brush. On the Third Avenue Railroad and the Georgia Railway & Power Company the bearings are sand blasted. Oil and grease are sometimes removed by dipping the bearings in saturated caustic soda solution. In Omaha the bearings are boiled in Wyandotte alkaline solution manufactured by the J. B. Ford Company, Wyandotte, Mich., after they are brushed off. The pickling of bearings by immersing them in dilute sulphuric acid is not generally practiced except where they are in bad condition. Where acid dips are used, they should be followed immediately by a thorough washing of the bearings in clean water.

For the information of those who find it desirable to clean their shells in some sort of solution, a sulphuric acid solution which produces satisfactory results can be made by taking 10 gal. of 66 deg. B. commercial sulphuric acid to 100 gal. of water. The specific gravity of this solution is 1.072 at 86 deg. F. and 1.08 at 154 deg. F. Best results are obtained by maintaining this solution at a temperature of from 140 to 176 deg. F. when in use.

A satisfactory hydrofluoric acid solution can be made in the proportion of 11 gal. of 16 deg. B. commercial hydrofluoric acid to 100 gal. of water. The specific gravity of this is 1.015 at 61 deg. F. and 1.005 at 124 deg. F. This solution should be maintained at a temperature of 104 to 140 deg. F. while in use, and should be replaced when it takes on a brownish color.

TINNING BRONZE SHELLS

Where bronze or brass shells are used for bearings, it is the universal practice to tin the surface to be babbitted to hold the lining firmly in place. Cast-iron and malleable-iron shells are not tinned, but dovetail grooves or anchor holes are used for retaining the babbitt. The tinning practice includes three principal methods. The larger electric railways, such as the Chicago Surface Lines, the Milwaukee Electric Railway & Light Company and the Third Avenue Railway, which have many shells to be tinned at one time, invariably dip them into a pot of hot solder, which is maintained at a temperature of from 792 to 824 deg. F. The smaller electric railways such as the Eighth Avenue Railway and the New York & Queens County Railway, usually apply the solder by taking a bar and melting it with a hot soldering iron or else by heating the shells and applying the solder to the parts which are to be tinned, which is standard practice in Memphis and Atlanta. The hot shell then melts the solder. Of course it is necessary to use a flux on the parts to be tinned. This usually is a saturated solution of zinc in hydrochloric acid. The most common method of applying the flux is to swab it on.

Where shells are dipped in the soldering pot, it is necessary to coat the parts which are not to be tinned with some mixture which will prevent the tin from sticking where it is not desired. The most common material used is whiting or chalk. In Milwaukee a mixture of fireclay and water is used. Some railways use a thin mixture of graphite and water. After the parts have been coated and the flux applied, they can be dipped in either the soldering pot or in the babbitt pot and they should be left in until they are just hot enough for the molten metal to run off. After they are removed, it is the general practice to rub with the zinc chloride solution so as to make sure that there are no untinned spots left on the surface to be babbitted. In Brooklyn it is the practice to dip new shells twice in the solder where they have not been tinned previously.

After the tin has been properly applied, the surface should not be touched, but should be babbitted immediately. Possibly the most common mixture used for tinning is plumber's solder, half tin and half lead, although some roads vary these proportions. One manufacturer recommends using 35 per cent tin and 65 per cent lead. The Milwaukee Electric Railway & Light Company uses 90 per cent tin and 10 per cent lead. It is stated that the small quantity of lead is used in order to prevent contamination of the babbitt with the lead from the tinning.

BABBITTING THE BEARING

It is the usual practice to follow with the babbitting while the shells are still hot from the tinning operation, the babbitting jigs and mandrels having been previously prepared to receive the shells. Of the 20 railways from which information was obtained, 14 followed this method. In Memphis, Omaha and Milwaukee, the bearings are placed on a shelf around the babbitting furnace. The New York Central Railroad and the New York & Queens County Railway preheat by means of a torch. In Toronto shells are preheated in the furnace used for melting out old babbitt. The mandrels are preheated to prevent chilling of the babbitt when it is poured. The usual method of doing this consists of standing the babbitting jig on a shelf adjacent to the babbitting pot. Some railways have babbitting furnaces with ovens and the jigs and mandrels are placed in these for preheating. Mandrels for solid bronze shells should be heated to approximately 212 to 257 deg. F. and split bronze shells are usually heated to a somewhat higher temperature. Mandrels for use with malleable iron shells are sometimes heated to as high as 572 to 662 deg. F. Where bearings are tinned and then set away before the babbitting operation, it is of course necessary to preheat them specially before the babbitt is applied.

The mandrels are made with an allowance for boring the rebabbitted bearing. The information obtained shows that this allowance varies from 1/16 in., which is used in Omaha, to ⅜ in., which is allowed by the New York & Harlem Railroad. The majority, however, make an allowance of ⅛ in. under that of a new shaft. Most electric railways are using undersized shafts for some motors. Where bearings are fitted to these, of course, a smaller amount of the babbitt is bored out.

TABLE I—BABBITT COMPOSITION AS USED ON 20 ELECTRIC RAILWAYS

Company	Composition in Per Cent Tin	Lead	Antimony	Copper	Remarks
Brooklyn-Manhattan Transit Corporation	83⅓	....	8⅓	8⅓	....
Chicago Rapid Transit Co.	89	..	7	4	....
Chicago Surface Lines	83⅓	..	8⅓	8⅓	....
Denver Tramway					
Armatures	...	...	..		More-Jones metal
Axles, old standard	86¾	3	7	3¼	....
Axles, new standard	22	64½	13	½	....
Eighth Avenue Railway					
Armatures	...	....	...	..	More-Jones metal
Journals	...	....	...	..	Brill and More-Jones
Georgia Railway & Pwr. Co.					
Armatures	...	....	...	..	Westinghouse metal
Axles and journals	...	....	...	.	More-Jones metal "Regent"
Illinois Traction, Inc.	86	....	9	5	....
Long Island Railroad					
Armatures and axles	85	..	..	.	Antimony and copper to make 100 per cent
Journals	...	...	...	..	Zero metal
Memphis Street Railway	...	...	...	..	More-Jones metal
Milwwukee Electric Railway & Light Company, The	83⅓	.	8⅓	8⅓	....
New York Central Railroad					
Armatures and axles	...	....	...	..	Tin base
Journals	...	....	...	..	G. E. lead base
New York & Harlem R. R.	...	....	...	..	Tin base
New York, New Haven & Hartford Railroad	...	....	...	..	Tin base
New York & Queens County Railway	...	...	...	..	Tin base
New York, Westchester & Boston Railroad	83⅓	...	8⅓	8⅓	....
Niagara, St. Catharines & Toronto Railway	...	....	...	..	Hoyt's formula
Omaha & Council Bluffs Street Railway					
Armatures	84	....	10	6	....
Axles	5	80	15	..	....
Third Avenue Railway	...	....	...	..	Tin base
Toronto Transportation Commission	83⅓	....	8⅓	8⅓	....
Youngstown Municipal Ry.	...	....	...	..	Special nickel-bronze

Some railways take special precautions to prevent the sticking of the babbitt to the mandrel and also to prevent blowholes in the babbitted portions. It seems to be quite general practice to provide the mandrels with a slight taper to assist in their removal, and to keep them highly polished and oiled frequently. Some reported that they paint the mandrels with graphite and oil every morning before starting to pour the babbitt. The Brooklyn-Manhattan Transit Corporation uses a solution of fireclay and dips the mandrels in this solution about every fourth pouring. This railway also states that the use of fireclay materially assists in preventing blowholes, as it gives a very smooth finish to the babbitted portion. The majority of railways, however, report that no special precautions are taken with the mandrels to prevent blowholes, but they make certain that the babbitt is thoroughly mixed by agitating the molten metal just previous to filling the ladle. Blowholes are frequently caused by damp or wet mandrels or dampness in the bearings themselves. If the mandrels and bearings are carefully preheated they naturally will be dry.

FORMULAS USED FOR BABBITT

A large variation was found to exist in the formulas used for babbitt by the different railways. The majority of those visited, however, preferred a tin base babbitt metal. Of the railways using the tin base metal, the percentage of tin varies from 83⅓ per cent to 86 per cent, with antimony varying from 8⅓ per cent to 10 per cent, and copper varying from 4 to 8⅓ per cent. The formula frequently referred to as genuine babbitt is quite commonly used. This consists of 83⅓ per cent tin, 8⅓ per cent antimony and 8⅓ per cent copper. The composition used by each of the companies included in the survey is given in Table I.

Several of the railways using a tin base babbitt metal exclusively for their armature bearings include a small amount of lead for their axle and journal bearings and obtain good results. The small railways are nearly all buying standard babbitt metal as furnished by the various manufacturers. These include a great many varieties with special trade names and distinctive qualities. They usually contain from 80 per cent to 90 per cent of tin or lead as their principal element. The larger railways, however, make their own babbitt metal according to the proportions which they find most satisfactory.

Of the railways from which information was obtained, fifteen reported that they used old babbitt, while five, including the Chicago Surface Lines, the New York Central Railroad and the Long Island Railroad, make no use of second-hand babbitt. Of those using old babbitt, six use this for all bearings, four use it only for axle bearings, four use it for both journal and axle bearings, and one railway employs the babbitt for miscellaneous uses such as sash weights and other parts of similar nature required about the shop. The Chicago Surface Lines returns the old metal to the manufacturer for reconditioning.

After Pouring the Babbitt, Various Fins and Excess Babbitt Around Windows and at Edges as Shown in the Insert Must Be Removed. This Can Be Done Most Conveniently by Use of a Hot Iron as Shown

The temperature at which babbitt metal is poured into the bearing is vitally important. Manufacturers recommend that the babbitt metal be not allowed to become hotter than 914 deg. F. Information obtained in this survey indicates that temperatures ranging from 700 deg. to 900 deg. F. are used, but as more than half of the properties were using babbitting pots not equipped with pyrometers, accurate information was not available. Railways which do not have pyrometer equipment in connection with their babbitting furnaces quite commonly use a pine stick for determining the temperature of the babbitt. If the stick starts to blaze when it is inserted in the babbitt pot the metal is considered to be at a sufficiently high temperature to pour. Of the railways visited, only six had babbitting departments equipped with pyrometers. All, however, realize the advantages of temperature control and several expect to install it soon.

The babbitt metal should be agitated at frequent intervals and always just before using, particularly if it has been standing in a molten condition for a considerable length of time. Where the babbitt pot is used infrequently, a covering of charcoal is frequently used to prevent the formation of dross. A common method of supplying this is to add a few handfuls of sawdust or oak shavings. The hot metal, setting fire to this, produces a covering of charcoal. The New York Central Railroad prevents oxidation by throwing a handful of sal-ammoniac onto the molten babbitt and stirring it in.

In order to insure that none of the dross enters the bearing while it is being poured, six of the 20 railways use self-skimming ladles. These ladles have a bridge extending down inside from the lip, so that the babbitt metal is taken from near the bottom instead of from the top of the ladle. In pouring, the babbitt should run from the ladle in a steady stream directly down along the mandrel to avoid splashing or pocketing of air. If the metal is splashed against the mandrel, it will cause blowholes and give a mushy bearing. Ladles should be kept in proper repair, and the lips free from burrs or other irregularities in order that the babbitt metal may be poured in a smooth round stream.

It is almost universal practice to pour all bearings in a vertical position unless the shape of the bearings makes this position inadvisable, in which case the bearing is inclined at an angle most suitable and convenient for pouring. Split bearings are commonly poured by placing the two halves together in a babbitting jig and pouring the two halves at one operation. A few railways, among them the Chicago Rapid Transit Company, pour each half of the axle bearing separately, and in this case the parting face is usually placed down. Several railways have special jigs for their axle and journal bearings, so that the metal is poured into these with the bearings in a horizontal position. In babbitting armature bearings, the practice of the various railways visited appears to be about equally between pouring with the flanged end up and down.

More than half of the railways visited babbitt the ends of the flanges on armature bearings in order to provide for wear at this point. Where the end flanges are babbitted, it is quite convenient to pour these with the flanged ends up, since the thickness of the metal applied to compensate for end wear will vary considerably. Of the railways which do not babbitt the end flanges of axle bearings, four build these up by welding on additional bronze and remachining. The New York Central Railroad turns off the flange and then sweats on a new collar.

In babbitting journal bearings, it is universal practice to allow a small clearance at the edges so as to provide for the entrance of oil as the axle rotates. This clearance is commonly taken care of by the mandrels, although in a couple of instances the railways scrape out a small quantity of the babbitt and round the edge.

In order to prevent babbitt metal from flowing out at the windows and at the edges, fireclay is frequently applied to the parts where there is excessive clearance with the babbitting jigs. After the bearings have been babbitted, the fins, burrs and excess babbitt are most commonly removed by using a hot iron. One railway reported that it filed and chipped off any excess babbitt, and another has a pneumatic tool for removing excess metal.

Some of the special practices used by various railways are of particular interest. Following are some points in babbitting practice followed on several of the railways. These illustrate how varying conditions influence the best methods to be used.

MILWAUKEE BABBITTING PRACTICE

From the pouring of the shell to the time the bearing goes into service on the motor, the details of its construction are under engineering supervision in the Milwaukee shops. Samples of the brass and babbitt compositions are subjected to chemical analysis in order to see that the standard is being maintained.

The bronze used for shells and linings consists of 85 per cent copper, 5 per cent tin, 5 per cent lead, and 5 per cent zinc. Fully six tons of this composition is poured a month for bearing purposes, of which approximately 50 per cent has been salvaged from wornout shells.

All babbitting of old and new brasses is done in a small room adjacent to the foundry. It contains the tinning pot, the babbitt pot and also the bench with three air-operated mandrel extractors. The new bearing shell is placed on the brickwork near the tinning pot to pre-heat it somewhat prior to tinning. As it has been previously rough turned both outside and inside, the proportions of the bearing not to receive tinning are coated with a solution of fireclay, applied by means of a brush. The bearing is then dipped into a tinning solution of 90 per cent tin and 10 per cent lead. This low quantity of lead has been used to prevent contamination of the babbitt with lead. If complete tinning has not been effected it is replaced in the tinning metal and the process repeated.

In addition to the anchorage offered by tinning, anchor grooves are cored into the shell to prevent the rotation of the babbitt lining. On a solid armature shell these grooves are made up in two parts, extending around the interior bore approximately ¾ in. from each end. Four longitudinal grooves connect with those which follow the contour of the shell, thus preventing the babbitt from turning or from sliding out of the end of the shell. While it is almost impossible to tin these grooves, the babbitt keys in to form an anchor. For split armature bearings the same style of grooving is used, but for journal bearings only longitudinal grooves are provided. These are somewhat heavier than those employed in armatures.

The mandrel used in Milwaukee, which is hollow, screws onto a piece of pipe fastened to the cylinder of the air-operated extracting device. A steel cover is held in place over the bearing window by means of a C clamp. With the mandrel and bearing in this position the babbitt is poured. Its temperature is held at 750 deg. F. as indicated by a pyrometer in the babbitt pot.

After the babbitt has set the mandrel is removed by means of an air-operated extractor. An adjustable hand clamp is placed over the top of the hollow mandrel and the C clamp is removed. When air is admitted to the cylinder, the piston is forced upward, causing a rod first to strike a plug which knocks out the window cover, and then to hit the cross-bar of the hand clamp, raising the finished bearing off the mandrel by means of the two tongs which engage the collar. Having a foot control this operation is accomplished very quickly. It is similar to that used in Cleveland, except that there the mandrels are pulled out instead of being pushed out, as in Milwaukee.

TABLE II—BOARD SHOWING PARTS USED FOR BABBITTING BEARINGS IN EAST NEW YORK SHOP OF BROOKLYN-MANHATTAN TRANSIT CORPORATION

	BGS.		Babbitting	Tool	Numbers
Type Motor	End	Mtl.	Broach	Mandrel	Base
West. 81	C E	BZ	6	19	30
	P E	BZ	7	20	55
West. 93	C E	BZ	7	20	31
	P E	BZ	1	14	32
	C E		7	47	33
	P E	..	1	48	34
West. 101	C E	BZ	8	21	35
	P E	BZ	8	21	35
	C E	CI	8	49	36
	P E	CI	8	49	36
West. 49	P C		4	17	59
West. 68	C E	Mall. I.	4	17	29
	P E	Mall. I	5	18	54
G. E. 57	C E	BZ	1	44	45
	P E	BZ	8	50	46
G. E. 64	C E	BZ	5	18	39
	P E	BZ	7	20	59
G. E. 80	C E	BZ	4	17	40
	P E	BZ	8	21	56
G. E. 234 A	C E	BZ	12	58	52
	P E	BZ	8	21	57
G. E. 800	C E	BZ	13	26	43
	P E	BZ	13	26	43
West. 50B	C E	CI	1	14	27
	P E	CI	2	15	28
West. 50E	C E	CI	1	14	27
	P E	CI	3	16	53
West. 50L	C E	CI	1	14	27
	P E	CI	3	16	53
West. 300	C E	BZ	9	22	37
	P E	BZ	10	23	38
Walker L 15	C E	BZ	12	25	41
	P E	BZ	8	21	42
G. E. 212 and 248	C E	BZ	1	14	60
	P E	BZ	2	15	61

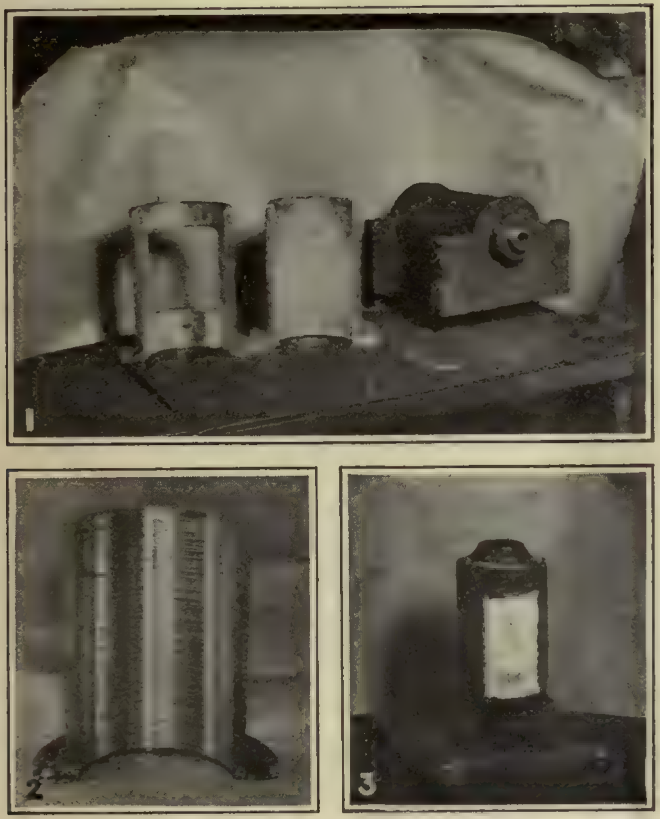
BABBITTING DEPARTMENT OF THE BROOKLYN-MANHATTAN TRANSIT CORPORATION

The Eastern Division repair shop of the Brooklyn-Manhattan Transit Corporation contains one of the most complete babbitting departments of any visited in this survey. Bearings are babbitted in this shop for all subway, elevated and surface cars of the system. The equipment consists of two babbitting furnaces and a tinning furnace, with semicircular benches for the workmen immediately in front. The semicircular bench is of particular benefit, since a man can reach all parts of it with very few steps from the furnace. Each babbitting furnace has two pots, one for armature bearings and the other containing a mixture with second-hand babbitt for axle bearings. As more armature bearings are turned out than axle bearings, workmen at both furnaces work on armature bearings regularly, and on journal bearings whenever opportunity presents.

All babbitting pots are provided with recording pyrometers. Smoke charts are used. They are taken off at the end of each working day, 4:30 p.m., and then dipped in a thin solution of shellac to make the record permanent. New charts are put on the pyrometers each morning at 7 o'clock. When removed the charts are dated, signed with the initials of the foreman, and the number of the furnace and a record number also added. Genuine tin base babbitt is used in Brooklyn.

Each bench is provided with a box of snap gages. When bearings are received in the babbitting department they are gaged, and any over which the snap gages will pass are thrown aside for scrapping.

A carefully worked-out system for keeping track of babbitting jigs and mandrels is used in the babbitting department. Each part is numbered and is placed in a definite location on storage shelves. A large board occupies one side of the babbitting department. On this is a tabulation in large numbers showing the various mandrels, bases and bands which should be used for each particular type of bearing, as shown herewith in Table II. The columns give the type of motor; the particular type of bearing which is to be babbitted, such as commutator end or pinion end, the material which is used for the bearing shell; the numbers of the various broaches used; the numbers for mandrels, and the numbers of bases. Thus, if a commutator end bearing for a Westinghouse No. 81 motor is to be babbitted, the workman uses mandrel No. 19 and base No. 30. This method reduces the number of the various parts and makes it easy for the workman.



Babbi.t Bearings in Chicago Rapid Transit Company Shop

No. 1. Axle bearing shells are babbitted in especially constructed horizontal mandrels producing a surface which requires no finishing.

No. 2. The anchorage used in the bearings extends within ¼ in. of each end.

No. 3. A preheated mandrel is used for babbitting armature bearings.

Bearings are poured with the babbitting metal at a temperature of 860 deg. F. The pyrometer records which were in place showed a variation of from 800 to 900 deg. Whenever new babbitt is added to the pot, the temperature drops but it is quickly brought up to the required temperature of 860 deg.

All armature bearings are poured in a vertical position with the small end down. In pouring split bearings, the flange or collar end of the bearing is down. The end flanges of armature and axle bearings are babbitted to provide for wear. After pouring a bearing, the burrs at the edges of the mold and at the bearing windows are removed by hot irons. A large forcing press is located between the two babbitting furnaces which is used for the removal of mandrels after the bearings have cooled. Equipment for grinding out excess babbitt by means of wire brushes is also included as a part of the babbitting department's machine tools.

OMAHA USES CAST-STEEL HOUSINGS

Babbitt-lined cast-steel shells are used entirely for axle bearings in Omaha, except where the diameter of the axle is so close to that of the bearing housing that there is not room for the babbitt-lined shell, in which cases ordinary bronze axle bearings are used. The minimum difference in diameter between the interior of the bearing housing and the axle which is considered sufficient to permit the use of babbitt-lined steel bearings is 1 in. Since the practice is to use from 3/16 to ¼ in. of babbitt in such bearings, the minimum amount of babbitt allows 5/16 in. thickness for the cast-steel shell. If the clearance between the axle diameter and the bearing housing bore is less than this, the solid bronze type of bearing is used without babbitt. This is true of some types of motors in service, where it has been necessary to increase the axle diameter, so that there is insufficient room for the standard babbitt-lined steel bearings. Similar babbitt-lined steel bearings are used for armatures, except where the bronze bearing supplied with new motors are still in use. All journal bearings are babbitt-lined bronze.

Anchor holes are cast directly in the steel shells of axle bearings and a special groove is cut with a shaper longitudinally on the inside face. This also acts as an anchor to hold the babbitt in place. This groove is kept close to the edges on each half of the axle bearings. A special type of internal clamp is used to hold the two halves of the bearing together while they are being machined. Anchor holes are drilled in bronze bearings, consisting of 10 to 12 holes of about ¼ in. diameter in each half, made as deep as practicable without allowing them to go through the shell.

ILLINOIS TRACTION PRACTICE

The practices in the manufacture and installation of bearings by the Illinois Traction, Inc., established some years ago, have resulted in an enviable record of no service failures from burned-out bearings due to the armature dropping upon the pole pieces. The finished bearing gives a life, with proper lubrication, of approximately 120,000 miles of service.

Following the customary method of tinning, the bearing is allowed to stand until the tin begins to solidify. This cooling of the bearing is considered an important factor in the successful pouring of babbitt and insures uniform cooling of the poured babbitt producing a homogeneous solid. If the babbitt cooled too slowly, the heavier ingredients would settle to the bottom of the lining.

A cast-iron mandrel is preheated to a temperature of approximately 300 deg. F., the temperature to which the bronze shell has been previously cooled, and then is placed in the center of the bronze shell. The mandrel is coated with a thin graphite solution to prevent blowholes in the babbitt.

As there is a foundry in the shop, it is possible to utilize scrap bronze shells in the manufacture of new ones. As high as 50 per cent of the composition is scrapped shells, while the remainder is of the following composition: copper 84 per cent, tin 12 per cent, zinc

3.5 per cent and lead 0.5 per cent. Most of the copper used in this composition is reclaimed from armature and field coils. This makes it necessary to deoxidize the composition and also eliminate to some extent the phosphorus present in the copper. A solution of muriatic acid and zinc chloride is used for this purpose, three ounces to 100 lb. of metal being the proper amount. Borings from the machine shop are also used. These are passed through a magnetic separator in order to eliminate the iron and steel, and then are placed directly into the furnaces. Often as much as 25 per cent of the composition is made up of borings.

The foundry has two coke furnaces with a capacity of 175 lb. each. The total amount of bronze poured per day amounts to 800 lb. This output includes bronze bearing shells, trolley wheels, and other small car parts.

Motor axle bearings are not babbitt lined, but are of the same composition as the armature bearing shell. These are cast in the foundry and are machined to the proper size. The company does not make its own journal bearings, purchasing standard M.C.B. brasses ready to insert in the box.

CHICAGO RAPID TRANSIT COMPANY EXPECTS BEARING LIFE TO EXCEED OVERHAUL PERIOD

On some divisions of the Chicago Rapid Transit Company's lines, the babbitt-lined armature and axle bearings of the motors have a life in excess of the mileage run between motor car overhaulings. While this practice was formerly the standard on the entire system, the company is now experimenting with a solid bronze bearing sleeve which has proved very successful on one division.

At the Metropolitan Division shops, the babbitting and rebabbitting processes are carried on in the conventional manner. In the case of armature bearings, the babbitt is poured around a steel mandrel, while the window in the shell is closed by means of a wood block. Axle bearings are originally of solid bronze and are babbitted only after the wear is in excess of ⅛ in. A special mandrel of the exact size of the axle is used which holds the lining in a horizontal position while the babbitt is poured, and gives a 3/32 in. thickness of babbitt around the inside bore and on the end-thrust collar. These bearings are rebabbitted until they fail mechanically. Some axle bearings used by this company do not lend themselves readily to rebabbitting and are therefore scrapped after they have received the initial wear.

In preparing either armature or axle bearing shells for babbitting a similar procedure is followed. With new armature bearings from manufacturers specializing in this work, the inside bore is given a rough cut to within ¼ in. of each end to provide an anchorage for the babbitt lining. The cut is made on a lathe with the feed set to give approximately four cuts to the inch. With the shoulders left at the ends and this rough spiral cut, the babbitt is held securely in place and no trouble has been had with loose babbitt. As a final test, before the bearing is placed in service, it is suspended and struck a light blow with a hammer. If it produces a clear ring like a bell the babbitt has a complete amalgamation with the shell; otherwise it is an indication that there is an air pocket or loose spot between the babbitt and the shell.

After the shell has been prepared by the anchorage cut, it is not necessary to recut the grooves throughout the useful life of the bearing.

With this type of bearing, records indicate that with proper oiling, a life of over 100,000 miles is obtained consistently. As this is the mileage which is used as a basis for overhauling motor car equipment, there is little necessity for having a bearing with greater life. At the overhauling period, it is the practice to replace all bearings on the car and to fit each individual armature bearing to its shaft.

DENVER BEARING PRACTICE

The present practice of the Denver Tramway is to machine all bearing shells both inside and out, although formerly the castings were used in the rough state. Some babbitt lined cast iron shells are used for axle bearings on the older types of motors. For armatures babbitt lined bronze, solid bronze and babbit lined cast iron bearings are used. The cast iron shells are used only on some of the older types of motors, chiefly the GE 58. Journal bearings are all babbitt faced bronze.

The amount of babbitt used varies with the size of the shell as only one standard arbor is used for casting the babbitt of each type of bearing. While a recording pyrometer is not used in the babbitt pot, one will be installed when contemplated improvements in existing practices are carried out.

Babbitt is used on the end flanges of all babbitted armature and axle bearings. When solid bronze bearings are worn through, they are babbitted and used over again. Because of the 42-in. track gage in Denver, no axle collars are used as the motors occupy all the available space between the wheels.

Cast-iron bearing shells are cored out with six lugs, which are 1/16 in. over the armature shaft diameter. Thus the babbitt thickness over the lugs is small enough so that there is no danger of the armature getting down on the pole pieces in the event of failure of the babbitt.

NICKEL-BRONZE BEARINGS USED IN YOUNGSTOWN

After exhaustive tests which extended over a two-year period, during which different formulas of babbitt metal and different methods of handling the rebabbitted shells were tried, the Youngstown Municipal Railway, Youngstown, Ohio, decided to equip all of its rolling stock with a good grade of solid nickel-bronze armature bearing without a babbitt lining. The treatment of the bearing shells previously used by this property is very interesting inasmuch as the company tried various means of procuring a satisfactory bearing before adopting the present standard. During the experiments iron, brass, and bronze shells were used with about equal success. When the shell was new, there was little difficulty in obtaining satisfactory bearings. However, the rebabbitting of shells presented the most serious problem, both from a physical and economical standpoint.

In preparing these shells for rebabbitting several methods were used. The shells were pickled in pickling vats for 48 hours to remove all grease and dirt; they were burned and baked in gas ovens, and some even were copper plated after they had undergone these preliminary treatments. Various types of anchorage were used to hold the babbitt in the shells. These included dovetailed grooves from end to end of the shell, holes drilled through the shells and countersunk on both sides and tinning of the inside of the shell with a formula of 75 per cent tin and 25 per cent lead. This later was reduced to 50 per cent tin and 50 per cent lead.

Equipment and Methods Used for Babbitting Bearings in the Shops of the Milwaukee Electric Railway & Light Company

No. 1. Armature brasses are coated with fire clay on portions which are not to be tinned. Grooves in the casting serve as an anchorage for the babbitt.

No. 2. Journal brasses have babbitt held in place by two longitudinal grooves.

No. 3. The babbitted bearing is removed by means of an air-operated mechanism. The tongs engage the flange of the bearings while the rod on the air cylinder provides the lifting power.

No. 4. Pouring brass in the foundry of the Milwaukee Electric Railway & Light Company.

No. 5. Axle bearing castings which represent a portion of six tons of the bearings poured per month in the shops of the Milwaukee Electric Railway & Light Company.

After being tinned the bearings were placed in various positions for pouring the babbitt. Mandrels were used, the bearings were poured solid, and some were even poured while the shell was being turned in a lathe at 3,600 r.p.m. In this latter process a special jig was set up in order to get a uniform thickness of babbitt without air holes. Various thicknesses of babbitt were tried inside the shells of the finished bearing, the thickness on the side wall at first having been ⅛ in. which was later increased to ½ in.

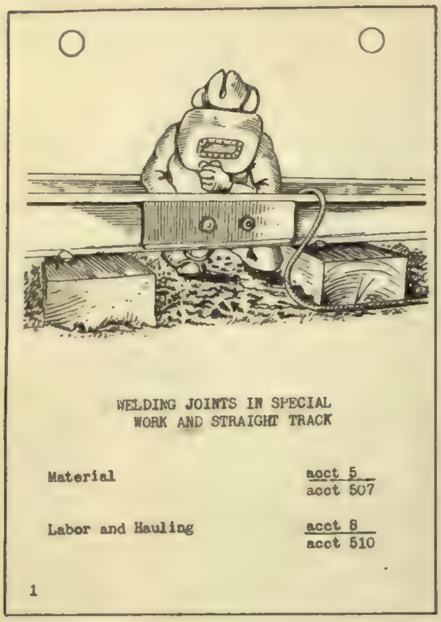
Precautions were taken to see that the motor housing was in the proper shape to receive the bearing. As another precaution, armature shafts were renewed or re-machined preparatory to running in the new bearings. Motors were run on a test rack at maximum speed for 10 minutes after which it was specified that the armature must be free to turn by hand. Even with these precautions, and under favorable conditions, a fair average for this type of bearing was found to be 48,000 miles although some ran 80,000 miles. This mileage is much less than that obtained from the babbitt-lined bearings received from the manufacturer on new motors.

However, the company was able almost to equal the mileage of new bearings by making new brass shells, lining them with new babbitt and placing them in a rebored motor housing with a new armature shaft. The cost of this procedure was prohibitive, and other means were sought to obtain bearings that would give long life. While these tests were going on, it was found that no matter what precautions were taken to remove oil and grease from the shells, still it would show up when the shells were preheated preparatory to rebabbitting. This grease would prevent the babbitt from adhering to all the surface of the shell, and an air space or bad contact between the shell and babbitt was formed. Such a space kept the heat generated in the bearing from passing off through the shell. At such spots the bearings showed heat and the babbitt started to melt.

Following these tests, it was decided gradually to equip all of the motors with bearings of the best grade of nickel-bronze obtainable. The rough bearings are purchased from a manufacturer in Pittsburgh. They are obtained with an excess amount of stock to be bored out of the inside. It is the practice to machine at least ¾ in. from the inside of all bearings and 3/16 in. from the outside, allowing 0.015 in. clearance for a shaft of approximately 3 in. diameter and 0.022 to 0.025 in. clearance for an armature shaft of approximately 4 in. diameter. As a part of this installation, the armature shafts are turned or renewed in order to provide a perfect bearing. An end slug allowance of 1/32 in. is given all motors. The motor housings are rebored and the bearing is made 0.001 in. larger than the hole in the motor housing per inch of diameter, to provide a pressing fit.

These nickel-bronze bearings have run as high as 175,000 miles, while a good average for those in service is around 157,000 miles. Due to its longer life, the bearing does not require as close inspection as one lined with babbitt, does not need as much lubrication after it has been in service for a short while, and has been found particularly valuable for reboring purposes after it has been used. When a bearing is worn too large for a particular shaft it may be rebored to fit one a little larger. This rebored bearing has the advantage over a new bearing that it is soaked with oil and does not require the careful attention that a new bearing does.

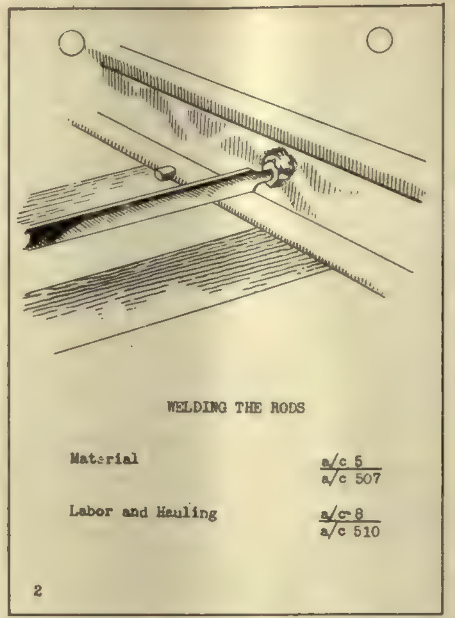
Of the motor equipment, 75 per cent is now provided with this type of nickel-bronze bearing. It is hoped that all of the company's motors will be changed over by the end of this year. The company has been several years in making this change, but it is felt that the results obtained from the new nickel-bronze bearings more than repay for the trouble and inconvenience that have been incurred. In all that time it has operated some 17,000,000 miles on this type without a hot armature bearing. The same type of bearing is also used for axles.



WELDING JOINTS IN SPECIAL
WORK AND STRAIGHT TRACK

Material	acct 5 acct 507
Labor and Hauling	acct 8 acct 510

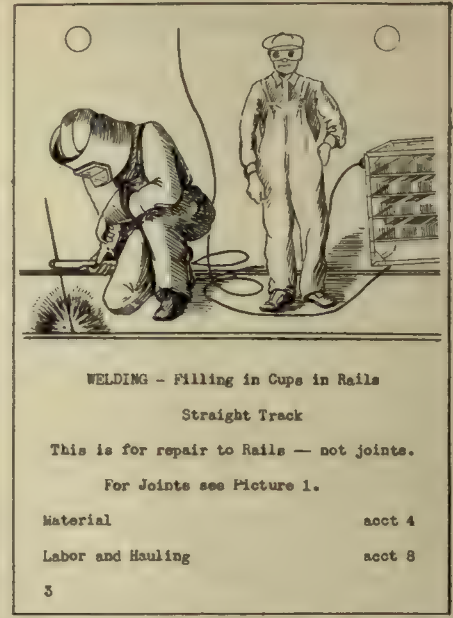
1



WELDING THE RODS

Material	a/c 5 a/c 507
Labor and Hauling	a/c 8 a/c 510

2



WELDING - Filling in Cups in Rails

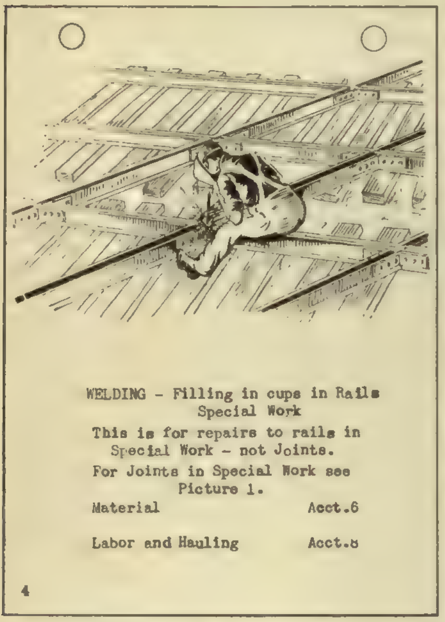
Straight Track

This is for repair to Rails — not joints.

For Joints see Picture 1.

Material	acct 4
Labor and Hauling	acct 8

3



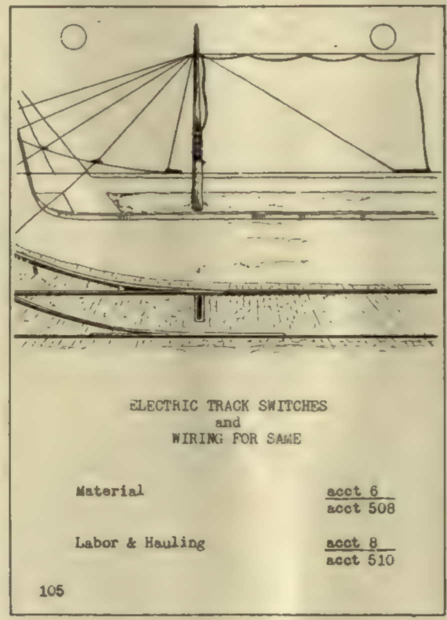
WELDING - Filling in cups in Rails
Special Work

This is for repairs to rails in
Special Work - not Joints.

For Joints in Special Work see
Picture 1.

Material	Acct.6
Labor and Hauling	Acct.8

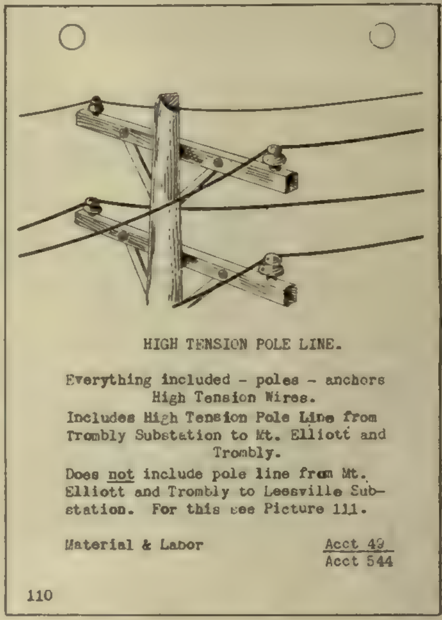
4



ELECTRIC TRACK SWITCHES
and
WIRING FOR SAME

Material	acct 6 acct 508
Labor & Hauling	acct 8 acct 510

105

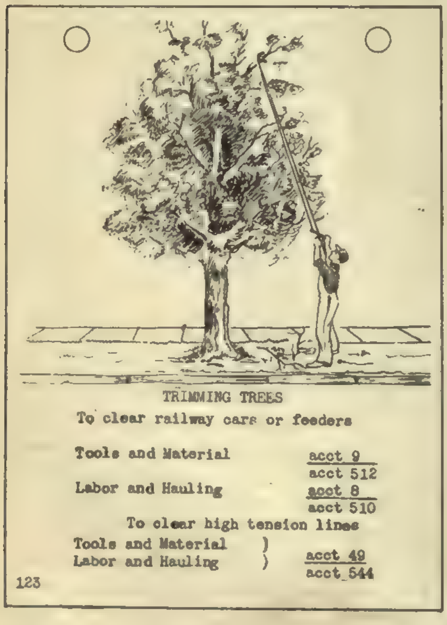


HIGH TENSION POLE LINE.

Everything included - poles - anchors
High Tension Wires.
Includes High Tension Pole Line from
Trombly Substation to Mt. Elliott and
Trombly.
Does not include pole line from Mt.
Elliott and Trombly to Leesville Sub-
station. For this see Picture 111.

Material & Labor	Acct 49 Acct 544

110



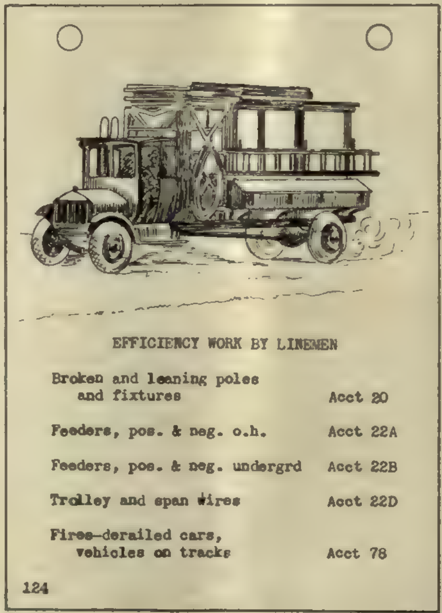
TRIMMING TREES
To clear railway cars or feeders

Tools and Material	acct 9 acct 512
Labor and Hauling	acct 8 acct 510

To clear high tension lines

Tools and Material Labor and Hauling	acct 49 acct 544

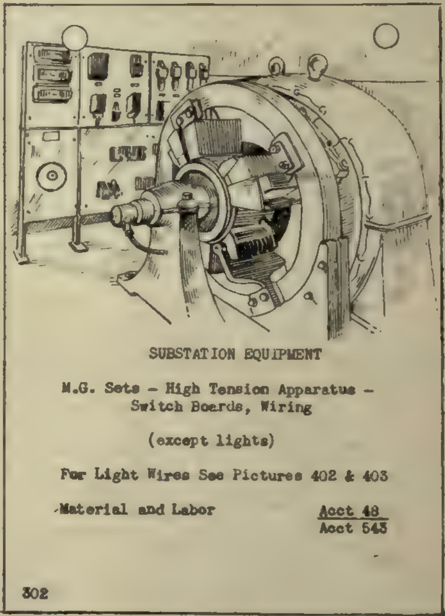
123



EFFICIENCY WORK BY LINEMEN

Broken and leaning poles and fixtures	Acct 20
Feeders, pos. & neg. o.h.	Acct 22A
Feeders, pos. & neg. undergrd	Acct 22B
Trolley and span wires	Acct 22D
Fires—derailed cars, vehicles on tracks	Acct 78

124



SUBSTATION EQUIPMENT

M.G. Sets - High Tension Apparatus -
Switch Boards, Wiring

(except lights)

For Light Wires See Pictures 402 & 403

Material and Labor	Acct 48 Acct 543

302

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Typical Sheets from Pocket Guide for the Classification of Electric Railway Accounts Used by Detroit Department of Street Railways

Correct Account Numbers Put on Jobs

By Means of Pictorial Instructions Foremen in Detroit Are Told How to Enter Correct Account Numbers on Their Work Sheets

THE adoption of the Interstate Commerce Commission's "Classification of Accounts for the Use of Electric Railways" was a great step forward, but its value necessarily depends on the care with which charges arising in practice are allocated to the proper account numbers. This in turn is affected by the knowledge of the accounts by the person or persons making the charges against the various accounts. In some of the major operations the correct account number is obvious, while in others, more especially in many of the minor operations, the reverse is true. If the account numbers assigned by the person with whom the charges originate are incorrect, the error will probably be carried right through the entire bookkeeping transaction.

Some people may say errors of this type are immaterial as long as the totals are correct and a reasonable allocation of charges by accounts is available for comparison purposes. This may be true, depending upon the mental attitude of the person by whom or for whom the accounting is being done. On the other hand, there is another factor in the situation, viz., the nuisance value because of differences of opinion over the proper accounts to which to assign charges for certain work. These differences may arise between foremen and timekeepers, timekeepers and superintendents, clerks and superintendents, etc., and generally relate to the most trivial subjects. It is obvious that any scheme which will reduce or, better still, entirely eliminate such differences is greatly to be desired.

It must be remembered that much of the work of allocation of charges for maintenance and construction work (except where timekeepers are employed for that particular purpose, which is not generally the case unless a large construction job is involved) is done by the men in the field who have personally done the work or else by their immediate superiors. It must also be remembered that the standard classification of accounts has five sub-classifications, each containing many divisions, the operating expenses alone comprising one hundred accounts. Some of the definitions of these accounts are quite extended. There are also printed in the last edition of the classification 440 questions and answers further defining and modifying the various charges to be entered under the account numbers.

To the accountant and to the engineer this volume of 250 pages is a problem in itself. What must it be to the foreman or timekeeper not specifically trained in its use? The accountant uses it from cover to cover, the engineer portions of it and the foreman and timekeeper limited portions. The foreman and timekeeper are in intimate contact with the field work, the engineer is in partial contact and the accountant only to a limited extent. In other words, those in closest contact with the work (where the major share of the charges originate) know the least about accounting. The field man is not apt to be equally proficient in the work to be done and in the method of accounting for it. His natural tendency is to memorize only a few account numbers and use these account numbers on his time sheet and material requisitions, rather than to consult the classification for the exact account number especially for minor items. At least, this is found to be the experience of the Department of Street Railways in Detroit.

To overcome this difficulty, H. M. Gould, electrical engineer (now acting assistant manager of the department), has prepared for the use of the electrical department's foremen a pictorial pocket guide (compiled after a thorough canvas had been made of all the possible types of work to be done, due regard being given to the various accounts and the 440 questions and answers) showing the correct account number to use in making charges. The sheets are divided into groups as follows:

Pages 1 to 100—Welding and Bonding.
Pages 101 to 200—Overhead and Underground Construction.
Pages 201 to 300—Power Stations.
Pages 301 to 400—Substations.
Pages 401 to 500—Light, Wiring and Telephone.
Pages 501 to 600—Laboratory.
Pages 601 to 700—General.

It has not been found necessary yet to provide this total number of sheets. At present the book altogether contains about 135 sheets, and gaps are left in the serial numbers for additional sheets as they may be found desirable. Reproductions of a few typical sheets, considerably reduced in size, accompany this article. The size of the pages in the book itself are 4 in. x 7 in.

To use the book it is only necessary for the man making the allocation to glance through the illustrations in the department to which the work belongs, it being well known that the people who will make use of a pictorial representation of facts have an inherent aversion to wading through a mass of text portraying the same facts. He will then quickly find the correct account numbers. Where there are two account numbers on a sheet, divided by a line, as with a fraction, as shown on several of the sheets, the user of the book is instructed to employ the upper number if the job is one of maintenance and the lower number if it is one of construction.

Provision is also made for the use of a manufacturing account (No. 411 in the classification) to cover such work as is done on supplies before they are charged out of stores.

Copies of this book, in blueprint form, are supplied to the superintendents of power stations, substations, lines and welding and bonding, also to the chief chemist, and electrical engineer. In addition to these copies the sheets showing the more common charges in each department are posted on the wall in a number of buildings where those most interested will be likely to see them. Later it is the intention to supply each field foreman with as many copies as he requires.

One-Man Operation in Arnhem

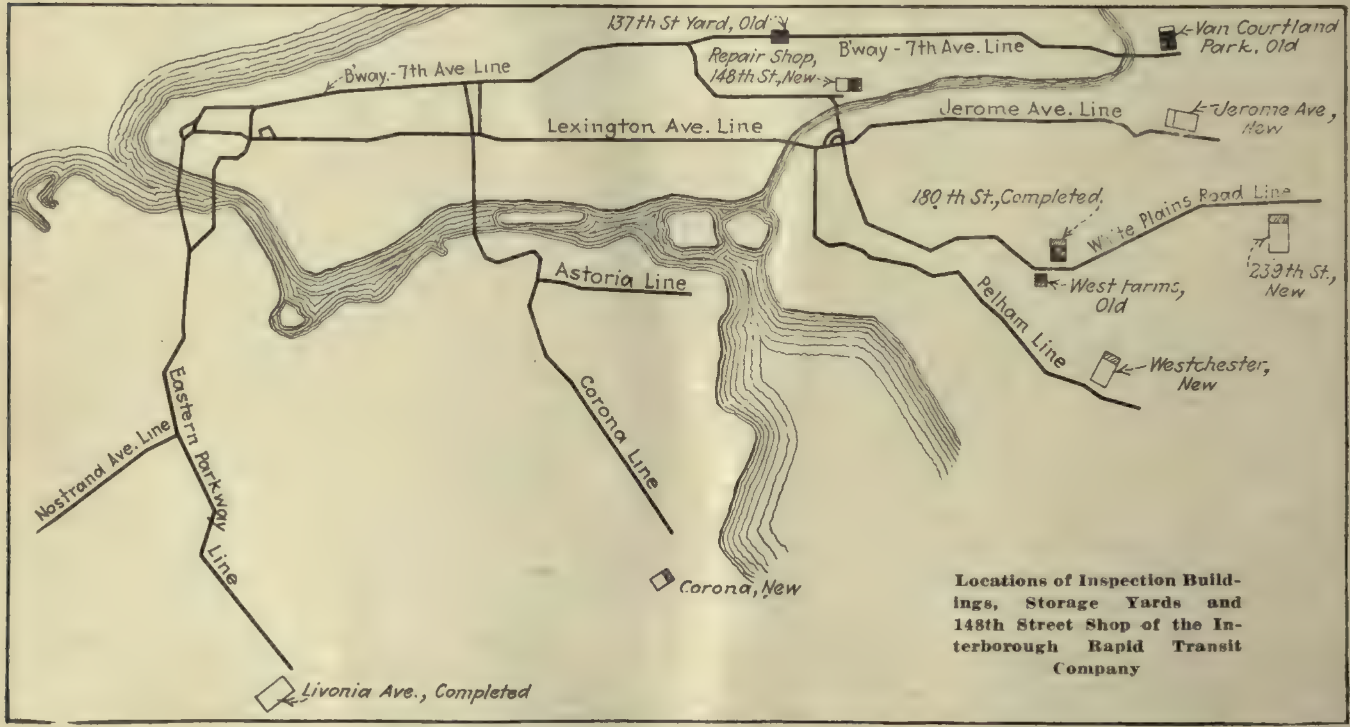
ONE of the leaders in one-man-car operation in Europe is the Arnhem Municipal Tramway System in Holland, on which several one-man cars were put in operation about 2½ years ago, after the manager of the system, P. M. Nieuwenhuis, had personally studied one-man operation in the United States. An account of the installation by Mr. Nieuwenhuis was published in the ELECTRIC RAILWAY JOURNAL for Dec. 2, 1922, page 881. The success of these cars has been so great that the entire system in Arnhem has been converted to one-man operation.

Interborough Inspection Shop Methods

Inspection of Elevated and Subway Cars on the Interborough Rapid Transit Railway Is on the Basis of 1,000 Miles for Motor Cars and 1,200 Miles for Trail Cars—The Work Is Thoroughly Planned — A Bonus Is Paid to Finders of Trouble of Vital Importance

WORK has recently been completed on a new inspection shed of the Interborough Rapid Transit Company at 180th Street. This is part of an extended plan for expanding the inspection and repair facilities of the company. There are now six inspection sheds of the company at which the work of making running repairs on the cars of the company is being conducted as follows: Bronx, 180th Street (completed); Bronx, Van Cortlandt Park (old shop); Bronx, West Farms (old shop); Bronx, Jerome Avenue (temporary); Brooklyn, Livonia Avenue (completed); Queens, Corona (temporary).

In additional, two other inspection sheds will be built as follows: Bronx, 239th Street; Bronx, Westchester.



Locations of Inspection Buildings, Storage Yards and 148th Street Shop of the Interborough Rapid Transit Company

This article will give an account of the methods followed in these inspection sheds. A later article will describe the shed recently completed at 180th Street.

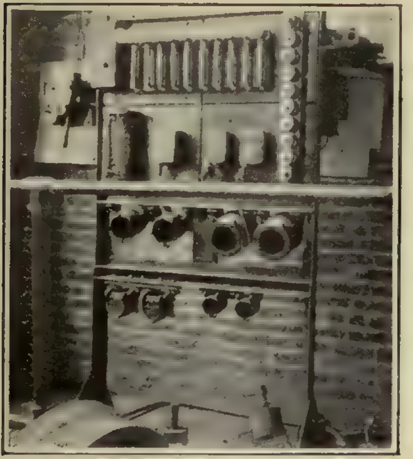
Each day the mileage clerk makes out a list, giving the numbers of the cars that are due for inspection, with the number of trips or mileage that each of the individual cars on the list has made since the date of its last inspection. A careful record is kept of the mileage made each day by each car, and motor cars are inspected every 1,000 miles and trail cars every 1,200 miles. After the mileage clerk makes out his list of cars to be inspected, one copy is sent to the shop department and another copy to the train dispatcher.

As soon as a car is put in the inspection shed for inspection and repairs, the car checker compares the car numbers with his inspection list and puts a white inspection or work card on each car that is due for regular inspection. The front of the card so used is reproduced on page 240. The back of the card contains space for record of the inspection of the storage batteries, as each car on the system carries a battery for emergency lighting. There are 26 cells, and the gravity, height of electrolyte, volts per cell, and total volts are recorded. The fact that the inspection card carries a list of the jobs to be done relieves the individual workman from a great deal of bookkeeping, because he has simply to make his entries on this card. On roads of the size of the Interborough where several hundred men are employed on inspection and repair, it is considered very essential that each individual should be held directly responsible for the work he performs. This the work card illustrated allows, because it has listed all of the various parts of the equipment with space for the signature of the man who does the work.

No car is allowed to leave the pit until all items have been signed up. There are two other cards somewhat similar to the inspection card, as will be described later. One is blue and the other is red. This distinguishes them from the general inspection card reproduced in the first illustration because it is white.

BLUE AND RED INSPECTION CARDS

The blue inspection card is attached to those cars in a train in the inspection shed which are not due for inspection, not having completed the mileage of 1,000 for motor cars and 1,200 for trail cars between inspections. Nevertheless, while these cars are in the shops, the company does give the more important parts, such as running gears, air brakes, draft rigging, and contact shoe devices a thorough inspection, and the parts of lesser importance a superficial inspection. The men sign up this card for work done in the same manner as with the white inspection card.


Rack for Testing Control and Bus Line Jumpers at 180th Street Inspection Shed

The other inspection card used is printed on red stock. It is used for regular inspection in the same way as the white card illustrated, but its color indicates that axle boxes, journals, etc., on the car are due for general oiling in addition to the inspection required on the rest of the car. The general oiling period is 10,000 miles. The entries on this card are printed somewhat closer together to allow for blanks covering the lubrication attention required. A separate entry on this card is made for motorman valves, feed valves, armature bearings, air compressors, center plates, triple valves, journal bearings, axle bearings and gears, and draft brake rigging and side bearings.

When all of the various classes of workmen have completed their work on a train and have properly signed the inspection cards, the train is pumped up, air brakes are tested, and brake rigging is adjusted, etc. The control and the motor circuits are then thoroughly tested. The train is then ready to return to service.

Other Blanks and Forms Used

Space will not permit a reproduction of all the various blanks used, but one other is shown on page 240 and a brief reference will be made to the other more important forms. The one reproduced is that used for lamp and fuse renewals, cars cleaned, etc. Some of the other blanks used during this inspection work include the following:

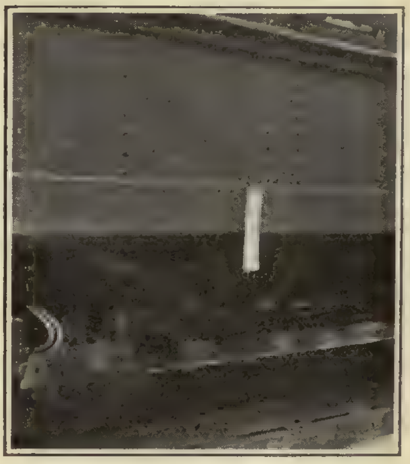
Report of broken glass replaced on cars.

Report of repairs made and defects found on the cars while in for inspection.

Report of journal brasses removed.

Report showing length of time the train was in the inspection shed.

Report of the cars inspected and mileage made since the last inspection.


As the Train Enters the Building a Clerk Places a Colored Tag on Each Car Indicating Kind of Inspection Needed

After these reports are filled out in the inspection shed, they are sent to the assistant to the general manager weekly. They are then tabulated and graphs are plotted showing the recurrences of different troubles, life of parts, etc.

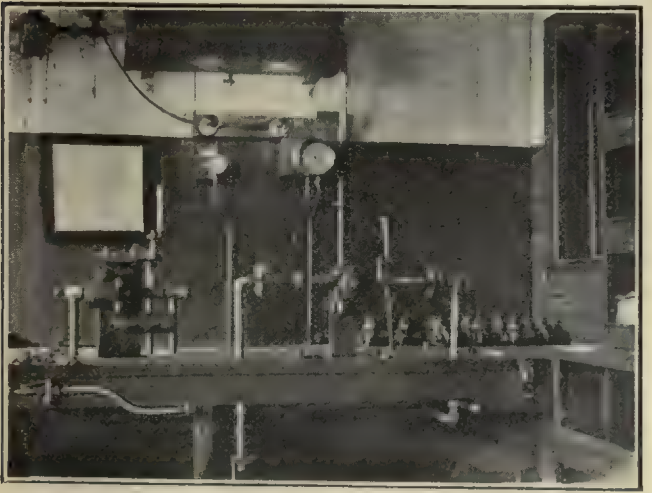
Division of Inspection Force and Layout of Gangs

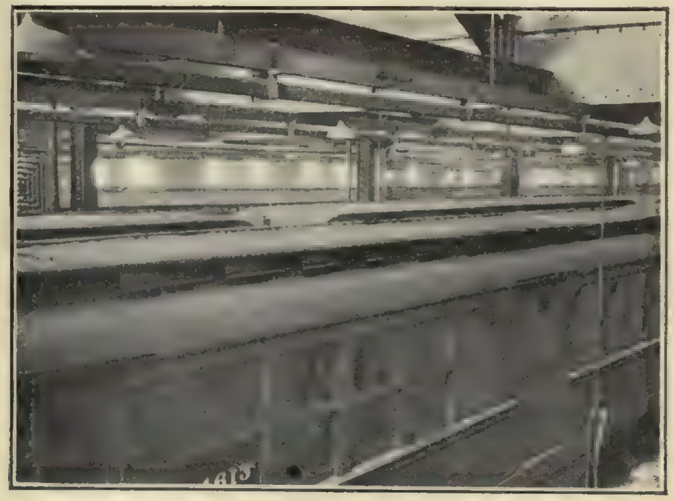
Outlines of the duties of the inspection force and of the work performed are given in the two lists, printed on pages 241 and 242.

At the 180th Street inspection shed as many as 144 cars per day are inspected and for this work nearly 250 men are employed. These men work one shift of nine hours, some coming on duty at six in the morning and others at seven. A cleaning force and two emergency men are on duty during the night.

Although the work of changing wheels is usually done only at the main repair shops at 148th Street, some of this work is done at the inspection sheds when it seems desirable.

The storeroom at the inspection sheds carries a very complete supply of replacement parts, but only a week's supply normally is kept on hand as the supply car makes a trip to the various locations every day. The oil sup-

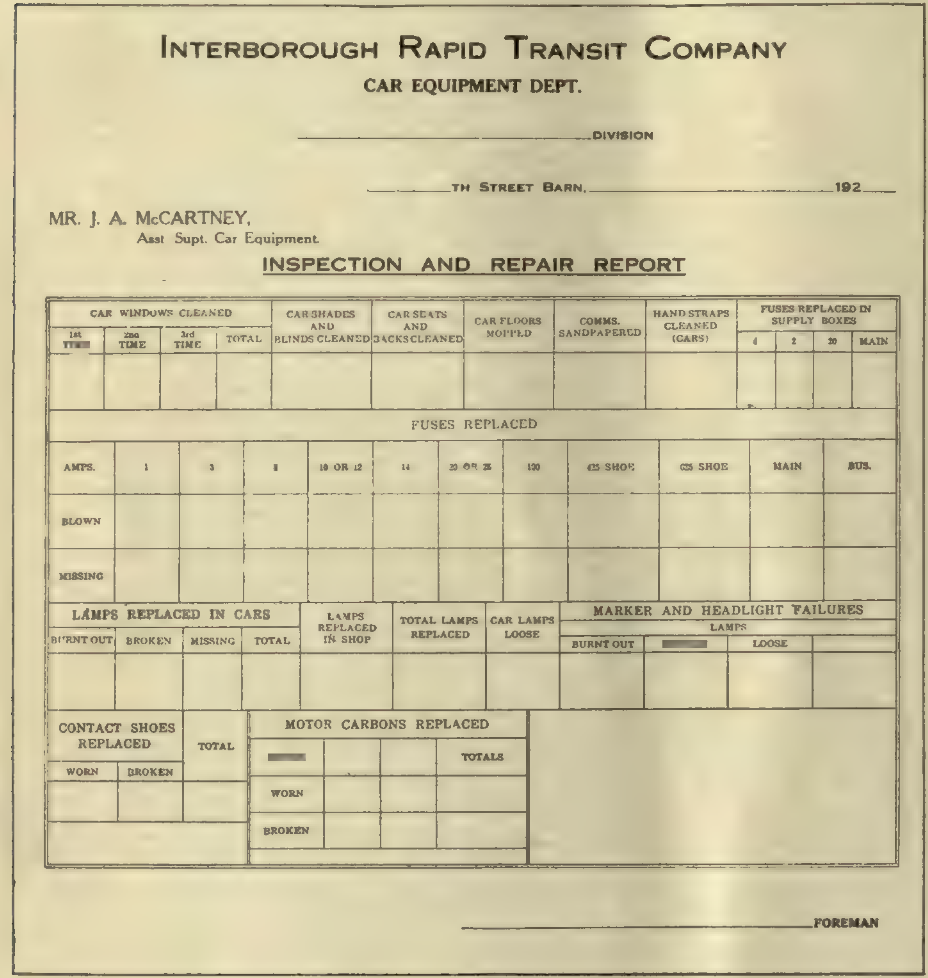

Rack for Testing Various Brake Valves, Feed Valves and Other Pneumatic Equipment


Power for Moving Trains Is Taken from an Overhead Conductor Through Flexible Leads

ply is cared for in a little different manner. The company has an arrangement with the oil companies whereby an oil tank truck delivers the supply direct to the inspection buildings. Storage tanks capable of holding two weeks' supply of the various oils used are to be found in the oil room.

FOLLOWING UP THE WORK

The work performed at the inspection shed is constantly being followed by a corps of special inspectors. These men drop into the various inspection sheds at unexpected times and check up the work and methods being employed. They report their findings directly to the assistant to the general manager.



INTERBOROUGH RAPID TRANSIT COMPANY
CAR EQUIPMENT DEPT.

__________DIVISION

_____TH STREET BARN, __________192___

MR. J. A. McCARTNEY,
Asst Supt. Car Equipment.

INSPECTION AND REPAIR REPORT

CAR WINDOWS CLEANED				CAR SHADES AND BLINDS CLEANED	CAR SEATS AND BACKS CLEANED	CAR FLOORS MOPPED	COMMS. SANDPAPERED	HAND STRAPS CLEANED (CARS)	FUSES REPLACED IN SUPPLY BOXES			
1st [redacted]	2nd TIME	3rd TIME	TOTAL						6	2	20	MAIN

FUSES REPLACED

AMPS.	1	3	[illegible]	10 OR 12	14	20 OR 25	100	425 SHOE	625 SHOE	MAIN	BUS.
BLOWN											
MISSING											

LAMPS REPLACED IN CARS				LAMPS REPLACED IN SHOP	TOTAL LAMPS REPLACED	CAR LAMPS LOOSE	MARKER AND HEADLIGHT FAILURES			
							LAMPS			
BURNT OUT	BROKEN	MISSING	TOTAL				BURNT OUT	[redacted]	LOOSE	

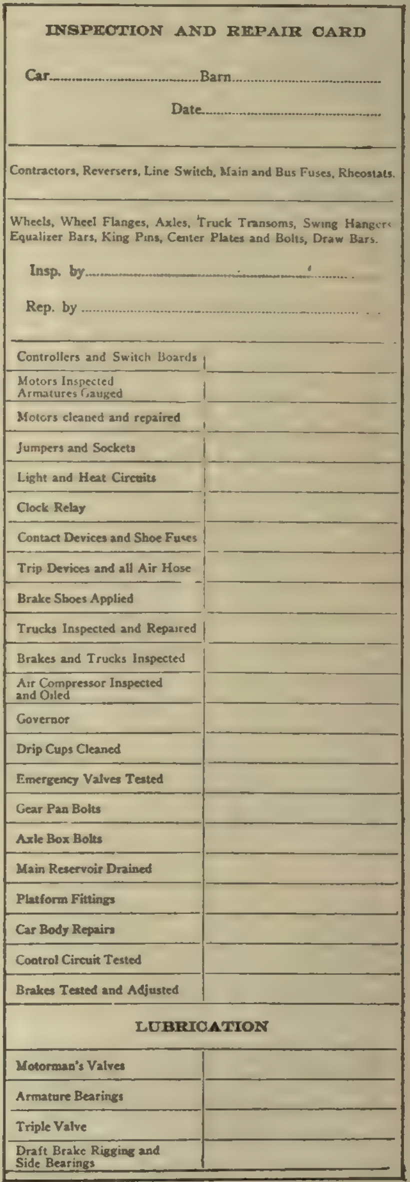
CONTACT SHOES REPLACED		TOTAL
WORN	BROKEN	

MOTOR CARBONS REPLACED			
[redacted]			TOTALS
WORN			
BROKEN			

__________FOREMAN

The work of inspection is also greatly helped by information received from the transportation department. This comes principally from the motorman's report book. The entries in this book are filled out by the motorman and conductor for every car that has trouble on the road. This report gives the number of the car, minutes delayed, time taken out of service, nature of trouble, names of conductor and motorman, etc. Two books of this kind are kept at each of the terminals, these books being used on alternate days. This permits one book to be sent each day to the shop foreman. The clerk makes a copy of the book each day and returns it to the terminal so that it will be available for the following day. In addition to the entries made by the trainmen, this book contains a space in which the shopman making the repairs enters the nature of the trouble actually found and the repairs made. Space is also provided for his signature.

In addition to the methods described for detecting trouble, the company follows the unusual plan of paying bonuses to employees for discovering vital defects. This bonus is paid to any employee, regardless of his classification or his rate of pay, who discovers and reports cracked or broken parts of the running gear of any car. This system of stimulating the detection of defects to the vital parts of the equipment keeps the men keyed up and is considered by the company the best possible insurance against serious road trouble happening.



INSPECTION AND REPAIR CARD

Car________Barn________
Date________

Contractors, Reversers, Line Switch, Main and Bus Fuses, Rheostats.

Wheels, Wheel Flanges, Axles, Truck Transoms, Swing Hangers Equalizer Bars, King Pins, Center Plates and Bolts, Draw Bars.

Insp. by________

Rep. by________

Controllers and Switch Boards	
Motors Inspected Armatures Gauged	
Motors cleaned and repaired	
Jumpers and Sockets	
Light and Heat Circuits	
Clock Relay	
Contact Devices and Shoe Fuses	
Trip Devices and all Air Hose	
Brake Shoes Applied	
Trucks Inspected and Repaired	
Brakes and Trucks Inspected	
Air Compressor Inspected and Oiled	
Governor	
Drip Cups Cleaned	
Emergency Valves Tested	
Gear Pan Bolts	
Axle Box Bolts	
Main Reservoir Drained	
Platform Fittings	
Car Body Repairs	
Control Circuit Tested	
Brakes Tested and Adjusted	

LUBRICATION

Motorman's Valves	
Armature Bearings	
Triple Valve	
Draft Brake Rigging and Side Bearings	

Above, One of the Blanks Used by the Inspection Force. At Right, Inspection Card Which Must Be Signed by the Man Doing the Work.

When this system of discovering defects is combined with the system described by which every man working on a car personally signs the inspection card for each part of the equipment he inspects and passes, assurance is made doubly sure that all defects are discovered and the necessary repairs are made.

HEAVY REPAIR WORK

Heavy repair work is performed at the 148th Street shop for the subway division and the shop at 98th Street and Third Avenue for the Manhattan division. The former is shown in the map on page 238.

Inspection Routine on the Interborough

(These regulations are referred to on page 239)

Contactors. Inspect and change when necessary, all arc chutes, contactor bases, auxiliary fingers, finger blocks and auxiliary contact plates. These parts are to be kept cleaned and properly adjusted. The contactor base bolts and shunts are to be kept tight. Inspect all motor and bus rheostat leads and jumpers on rheostats. Clean the insulating collars on the circuit breaker and reverser. Remove the covers of the control rheostat coils and inspect and clean them. Inspect the main bus and power fuse and wiring. Arcing plates are to be removed when loose, cracked or broken, and are to be cleaned on all inspections. The clock circuit fuse and fuse block are to be cleaned on all inspections. All relays are to be cleaned and the leads must be examined for loose connections. P. K. commutating drums are to be cleaned off with a damp kerosene cloth, and the fingers are to be adjusted and lubricated on every inspection. The bus and control connection boxes are to be cleaned and inspected on a 10,000-mile basis. The circuit breaker arc chutes are to be cleaned and the inspectors should see that the tips make proper contact, that all parts work freely, that the head is on tight and that the line breaker trips properly.

Motor Inspection. Inspect armatures, commutator, brush-holder, brushes, etc.

Batteries. Remove all storage batteries (Edison type). Test each cell for voltage and specific gravity. Measure the height of the solution. Clean all cells and keep the top oiled. Use only distilled water when the solution is renewed. Clean the top of the cells with steam on a 60-day basis. Inspect the leads and see that they are properly insulated and that the connections are tight.

Jumpers. Change all train-line jumpers on a four-month schedule. Remove all jumpers that are in bad order or over the age limit. Clean out the coupler sockets and clean and spread and tighten all terminals in sockets and jumpers. Inspect the springs and covers on all sockets. See that all jumpers are properly inserted before the train leaves the barn.

Contact Shoe Device. Inspect and gage all contact shoes and beams. Remove the covers and examine the shoe fuses and leads on a 10,000-mile basis. Test out all shoe fuses on every inspection. See that all bolts in the contact devices are tight. Remove all shunts and jumpers where they are worn or broken. Remove all shoes when worn.

Compressors. Fill the crankcase with oil at the filling elbow. Fill the commutator oil well at the oil plug on the commutator side of the motor bearing. Do not oil on the crankcase side. Inspect and clean the inside of motor shell, fields, commutator and brush-holder and replace worn brushes, etc.

Governors and Relays. Inspect and adjust the magnet and air governor fingers and the battery charging switch.

Controllers. Remove the cover from the controller to inspect it. Remove the arc deflector. Inspect the main blow-out coil. Inspect and clean the fingerboard and flash shields. Remove the auxiliary fingers and block to inspect and clean contacts. See that all fingers are properly adjusted. Change all worn or burnt fingers. Clean the segments on the cylinders. Oil all bearing points on the cylinder and gear wheel. See that the screws in the controller top and water cap, controller handle and reverser cup are tight. Replace all weak or broken dog springs in the handle. Clean and adjust the fingers in the master electric-brake valve and engineer's valve. Inspect and repair all MS-41 and 10 switches. Install fuses where they are missing. See that all ⅜-in. pilot valve cut out cocks are sealed. Replace all worn parts.

Switchboards. Inspect and clean the switchboards and examine fuse clips, fuses, switches, etc., on each inspection, including the main switches. See that the proper rated fuses are in the circuits.

Light Circuits. Cut in the light switches on all cars and test all circuits and markers. Replace all missing and burnt-out lamps and broken sockets. Test out the emergency light circuit on all cars. Replace all missing and blown fuses on the switchboards.

Indication. Clean the indication boxes and disk on the pole contacts. Make necessary repairs on each inspection.

Clocks. Open the cabinets in all clocks (coasting recorders) and see that they are wound and supplied with tape. Test all clocks and circuit with a 4-volt battery. The clocks are to be changed once a year for general cleaning and repairs. Clean the clock relays on inspection.

Testing Indication. Test the motorman's indication circuit on all cars and in train formation. See that all trains are equipped with lamps, jumpers and plugs before they leave the barn. Replace any missing covers on the motorman's lamp boxes. Replace broken seals and rings in the signal box covers where they are missing or broken.

Air Brakes. Test the electric brake and control circuits from each controller and the brake valve in the train, using the electric brake key to determine whether the electric brake master switch is operating correctly and the electric brake fuse is in place. When the controller is in "on" position, let go of the button and make a test of the pilot and "E" valves. Pull all conductor's valve cords and test them for operation. Make a test of the compressors by cutting in all compressor switches. Test the balance circuit by cutting in one balance switch and noting if all the compressors are working. Note that the governors cut in at 85 lb. and out at 100 lb. pressure. Note that no leaks exist in the pipe system. Test the motor circuit on all cars by using a 5-lamp bank across main switch. See that all MS switches have fuses in and are left cut out. Examine the inspection tags and see that all work has been covered and signed for. No trains must be sent out until all work is completed, inspection tags signed, and car in good operating condition. Go around train and see that no men are at work on cars before the train is trolleyed out of the barn. Report all defects noted to the assistant general foreman.

Air - Brake Valve Changes. Change for cleaning at the repair shop, all UE-5 triple-vent A & T valves, governors, etc., on a one-year basis. Change for cleaning the compressors head on a 90-day basis. Make pipe repairs. Tighten pipe leaks, etc.

Car-Body Inspection. Inspect and repair all manually and air-operated doors, draft rigging, car body, interiors, platforms, fitting, etc. Replace all missing and empty Pyrene fire extinguishers. Repair the markers and headlights. Replace any broken glass and missing shades. Inspect the sanitary hand holds. Test all emergency cords, bell cords and bells. Inspect all destination signs and see that each car is fully equipped with these signs. Remove and replace all signs that are disfigured. The foreman of car-body inspectors will make a personal inspection of all cars passing through the barn.

Safety Gates. Inspect, clean and lubricate all gates and slides. Unhook and inspect all locks and springs. Open the gate and inspect for broken rivets in it. Inspect hand holds on all cars passing through barn.

Trip-Device and Air-Hose Inspection. Inspect, gage and adjust all trip devices. Inspect all hose on the car for chafing, being loose at the nipple, or over the age limit. See that all pipe clamps are in place and tight and that all bolts in the air-hose clamps are tight. Mark the height of the tripper on the inspection tag when it is signed.

Axle Box Inspection. Inspect and tighten all axle box and gear pan bolts. Remove and replace all broken axle brasses.

Oil Armatures. Inspect the waste and bearings on all motors passing through the barn for inspection. Remove all waste above the bearing and see that it is well lubricated. Remove all short and hard waste. Gage the oil on every inspection.

Journal Inspection. Inspect the waste and brasses on all cars passing through the barn. Remove the waste and brasses on the general oiling. Test the waste on all inspections.

Drip Cups. Remove all oil from all drip cups on all motors. Lubricate all brake rigging and drawbar slides.

UE-5 Valve. Clean the high-pressure portion of the UE-5 valve and clean the brake cylinder pressure limiting valve on a 30-day basis. Clean the 1-in. dirt collector on inspection. Fill the oil well. Examine No. 3 vent valve and the motorman's emergency cocks on inspection.

Reservoirs. Reservoir tanks are to be drained on every car going through the barn.

Air Doors. Test all air doors. Clean and lubricate all hand bases, sides, rods and gears. Remove all dirt from the door track. See that the door works at proper speed. Make all repairs, including any required on the locking device.

Feed Valves. Change the cab and control feed valves every 30 days. Oil the motorman's brake valve on inspection. Clean the ½-in. cab dirt collector on inspection.

Detailed Duties of Inspection Force on Interborough

The General Foreman is in full charge of the inspection barn and of all men assigned to the barn. He is responsible for the proper maintenance of the car equipment under his supervision. He also sees that full service at all times is available for the transportation department.

The Assistant General Foreman assists the general foreman and takes over his work when he is absent. The duties of the assistant general foreman are to run the floor, to check up on work of men, to see that trains are pulled out of the barn when turned over to transportation department, to inspect personally all cars that are cut out for the shop and all trains reported for trouble, and to see that all cars are properly tagged for the shop and are recorded in the log book. He also is responsible to see that the motorman's report book is checked, that the repairs called for in this book are made and that the book is signed to indicate that the repairs have been made.

The Assistant Carhouse Foreman's duty is to check up all cars reported by the transportation department as in bad order, also to check up the men working on the control circuits and to assist in making repairs.

The Clerks and Assistant Clerks keep the general records. They take care of all correspondence and see that the time cards are properly registered and the time recorded. On these and all other matters in which he is in doubt the chief clerk is to consult with the general foreman and assistant general foreman.

The Car Checker checks and tags all inspection and non-inspection cars. He also checks the bad-order list for bad-order cars and reports on the trouble to the assistant general barn foreman.

The Storeroom Tender receives and cares for all material and sees that there is an adequate supply of material on hand at all times.

The Motor Cleaners clean the retaining rings, brush-holder insulators, and the inside of the motor shell, fields and connections.

The Car-Body Foremen are in charge of the car-body and air-door device inspectors. They also keep a record of all repairs made by them on car bodies.

The Car-Cleaner Foreman supervises all car-cleaning work.

The Air-Brake Foreman is in charge of all air-brake and mechanical work, car body, brake and draft rigging, trucks, wheels, axle box, journal lubrication and packing.

The Air-Brake Inspectors inspect all work done by the brakemen and helpers on the inspection of cars. These inspectors also have charge of the general inspection of the "non-inspection" cars and give special attention to the toggle bar, brake pin, special lock washers and cotter keys.

The Electrical Inspector and Trouble Repairmen make the repairs to the electrical equipment and check the inspection of electrical apparatus.

The Motor Lead Inspector inspects the motor leads, ground leads, cleats, clamps, etc.

The Truck Inspector inspects all trucks for cracks on the side frame and in the transoms, equalizer bars, wheels, swing hangers, etc., for all cars going through barn.

The Wheel Inspector inspects all wheels, trucks, car body bolsters, king pins, drawbars and carriers, center casting and bolts, outside and inside equalizer bars.

The Wheel Inspector (Night) inspects all wheels, trucks, drawbars, shoe beams and general equipment. Every car in for the night must be so inspected. He also reports all defects which he discovers to the night barn foreman and leaves a written report for the general foreman.

The Valve-Room Men clean and test all feed valves, clean and grind the compressor heads, clean the compressor strainers and make minor air-valve repairs.

The Brakemen and Helpers inspect and renew brakeshoes, brake rigging, side bearings and truck chafing plates, pedestal and equalizer bars, etc., inside and out. New cotter keys must be used for all replacements. The key must fit tight in the brake pin.

The Car Inspectors will keep in touch with dispatchers and will report promptly when called by the train crews. They should keep a close check on the motorman's book and sign up when the repairs are made. They should immediately notify the general foreman when ordering a train out of service. In case of any train trouble or delay on the division to which the inspector is assigned he will give a detailed report of such trouble in the car inspector's book, which is provided for such reports. The car inspectors should see that all trains have markers when they leave the terminals. They should also make any necessary minor repairs to doors, signal circuits, markers and light circuits and control circuits.

The Lamp Trimmers equip all trains daily with refilled and clean tail lights. They should inspect the tail lamps on all trains each trip and should see that all lay-up trains are equipped with freshly trimmed lamps at both ends.

Trolleymen and foremen are the only ones allowed to apply the trolley to a train or to trolley a train out of the barn. The trolley is not to be applied to any car or train while men are working on it. Trolleyman will test brakes (electric and pneumatic) on all cars, but the brake adjustment is done by the air-brake inspector, as already described.

The Night Car Cleaners sweep and dust all cars and remove all newspapers from under seats.

The Day Car Cleaners carry out the following program: (1) Clean windows; (2) sponge seats and seat backs; (3) mop car floors; (4) clean and wash lamp shades; (5) wash sanitary hand holds; (6) wash white ceilings; (7) wash or wipe fan blades; (8) renovate the interior; (9) dry clean the interior; (10) clean the markers; (11) clean and dust under the seats, etc.

Peter Witt Car Rebuilt for One-Man Operation

Youngstown Company Has Converted Four of Thirteen Such Cars for One-Man Operation—Provision Has Been Made for Opening Side Door by Street Men at Heavy Loading Points

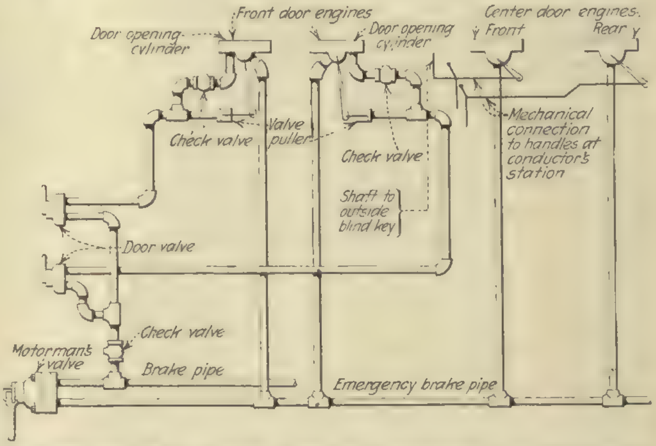
By A. B. Creelman
Master Mechanic, Youngstown Municipal Railway

IN ORDER that all of the rolling stock of the Youngstown Municipal Railway that is suitable might be operated by one man, 13 double-truck Peter-Witt type cars are being converted for this purpose. In making the changes necessary for safe one-man operation the company has not lost sight of the fact that the car may be needed for two-man operation during the rush hours and at some future time during the non-rush hours. Furthermore, it must be possible for these cars to be operated in trains with other cars equipped with GE emergency straight air brakes.

The fact that the converted cars are designed for single-end operation simplified the work of rebuilding. At the forward end the operating mechanism of the double folding doors was changed so that they could be operated independently as two single folding doors. These doors are air operated and controlled. They are interlocked with the air brake apparatus, and the H-L control is also interlocked with the doors so that power cannot be applied to the motors while any door is open.

Modifications of the company's standard practice were made necessary because it was not considered desirable to replace all of the air control and brake piping which was originally on the Peter Witt cars, as this piping was necessary when these cars were operated either to pull trailers or in multiple-unit trains. The modified layout of the door-operating mechanism is shown in the accompanying drawing. The GE emergency straight air brake equipment has the full pressure emergency air pipe, the door control being taken from the brake pipe line. A check valve was placed in the door control pipe just ahead of the control levers. A small bleeder pipe connects the door engine cylinder with the control pipe line at a point between the control lever and the puller valve on the engine. By introducing this by-pass and check valve in the control pipe the operator is forced to close the doors by means of his door valves, as the by-pass maintains the pressure within the control pipe, while the check valve in the control pipe prevents the escape of air to the air brake pipe. Without the check valve the door operating valve would be connected to the brake-pipe line, which is opened to atmosphere after the brakes are released. This would cause the doors to close automatically. However, at the next application of air the doors would be opened, if the door valves had not been closed. It is to eliminate this condition that the check has been introduced, while the bleeder pipe furnishes air to replace that lost through leaky control and check valves.

Another change from the standard layout of this company has been to take the door interlock contact off the door engine piston rod and place it directly on the door. Placing the interlock contacts directly on each of the four doors makes it impossible to start the car until the doors are actually closed. The necessary valves and reservoir were also installed to provide automatic sanding of the track when an emergency application of the brakes is made.



Modifications in Air Piping Give the Youngstown Car Full Safety Features, and at the Same Time Allow It to Be Operated in Multiple-Unit Trains Having G E Emergency Straight Air Brakes

The control of the two center door engines, which is mechanical, has not been changed, the two operating handles being mounted in the usual position near the side doors. When the car is operated by one man these handles are covered by a steel case which is locked in position, so as to prevent passengers opening the doors. During the two-man operation the box is removed. Air for the operation of the center doors formerly was taken

When Used as a One-Man Car the Center Side Door Control Handles Are Inclosed in a Locked Box to Prevent Passengers Opening the Door. When Operated by Two Men the Box Is Removed

The Side Doors of the Modified Youngstown Cars May Be Opened by a Street Supervisor by a Key Which Fits the Socket on the Side Exterior of the Car

Step Guards Have Been Provided at Adjacent Ends of Both Folding Steps at the Forward End of the Car to Prevent a Passenger Having His Foot Caught Between Them directly from the main reservoir pipe. In order that the doors would be unlocked and could be opened by hand in case of an emergency application of the brakes, this arrangement was changed so that air is now taken from the emergency pipe.

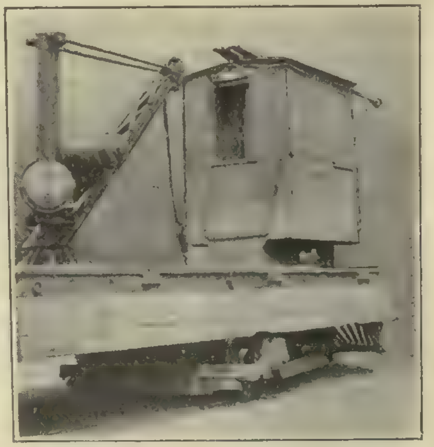
DOORS CAN BE OPENED FROM THE OUTSIDE

Means have been provided for opening the doors from the outside in order that the side doors may be used while loading in the downtown district during the evening rush hour. For this purpose a small ¼-in. square plug extends outside of the car. It is protected by a steel rim fastened to the side of the car. The plug forms the end of a rod which connects, by means of levers, with the control valve of the door-operating engines for the side doors. By means of a socket key, the street supervisor may control the door mechanism so that at the more congested loading points in the downtown district the supervisor can open or close these two doors from the outside. It is felt that this procedure will result in a considerable increase in the schedule speed.

As the car is operated by one man the double folding front doors are arranged to be opened individually. The forward one is for exit and the rear one for entrance, the passenger paying his fare as he leaves. A separate folding step is provided for each door. To prevent the departing passenger from getting his foot caught between the two steps a step guard has been fastened to the adjacent ends of both steps. These guards are of $\frac{1}{16}$-in. steel approximately 10 in. long and 4 in. high, and are cut to such shape that they will slide back under the platform when the steps are folded up.

As a part of the rebuilding program the hot-air heating system has been replaced by thermostatically controlled electric heat. The cars have been repainted inside and outside and the four which have been rebuilt present a very neat appearance. The company has nine more of these cars which are to be rebuilt.

Cheaply-Built Crane Car for Doing Light Work



Home-Made Crane, Mounted on a Flat Car of the Massachusetts Northeastern Street Railway

A HANDY crane car for doing the light work of the track department of the Massachusetts Northeastern Street Railway was recently built at the company's shops, Salem Depot, N. H., under the supervision of Harry Osgood, master mechanic. The underframe of an old flat car was reinforced by the addition of two extra 7-in. x 8-in. stringers. On the floor of the car was placed a base casting secured from a local foundry. The mast of the crane is a revolving 8-in. pipe passing through this casting and resting on an old truck center plate below the car floor. To this center plate has been riveted a larger plate which is suspended by four bolts from the base casting.

The interior diameter of the base casting is 1¼ in. larger than that of the pipe, and ⅝-in. rollers have been inserted. This permits free rotation of the crane. The jib is built of 4-in. channel irons braced as shown in the accompanying illustration. At the top of the mast a casting has been shrunk in and cap screwed. Iron rods connect this casting and the end of the jib.

A Shepard 3,000-lb. electric hoist is used. In order to test the capacity of this crane car experiments were made which showed a maximum lifting capacity of more than 4 tons. When not in use the hook is fastened to the floor of the flat car to prevent rotation of the crane. Electrical connection for the hoist motor has been arranged by means of a controller finger.

The Readers' Forum

Careful Storage and Handling of Lubricants Are Important

THE TEXAS COMPANY

NEW YORK, N. Y., Aug. 5, 1924.

To the Editors:

I have read with considerable interest your articles in the July 19, 1924, issue of ELECTRIC RAILWAY JOURNAL under the headings "Putting Car Oil Lubrication on a Higher Level" and "Oil Storage and Handling Practice." I was particularly interested in the parts referring to improved conditions for storage and handling of lubricants.

When The Texas Company actively entered the field of selling petroleum products to the electric railways, one of the most flagrant and neglected important factors, as affecting efficient lubrication and the care of lubricants, was found to exist on the majority of properties in connection with the storage and distribution of lubricants. In line with our general policy, our engineers set about correcting such conditions on the properties where we secured the business, by furnishing up-to-date storage tanks with measuring pumps, locked faucets, modern electrically heated waste saturating outfits and other equipment necessary to place this important matter on a desired system, which resulted in vast economies, the elimination of fire hazards and greatly improved conditions as pertaining to lubrication as a whole. The use of sand, sawdust and other materials to soak up waste oils is not only wasteful but often these foreign matters get into the lubricant itself, which results in an inestimable amount of damage to bearings and shafts, which in turn causes greatly increased cost of maintenance.

After giving due consideration to furnishing nothing but high-grade, suitable lubricants, and to see that the same are properly stored and a record kept of each amount used daily, a fundamental factor necessary for the efficient lubrication of trolley cars, in which the major part of lubricants are used, is the proper saturation of waste. Practical experience has proved that each pound of waste should not contain more than 2½ pints of oil. When a greater amount is allowed to remain in the waste, it is impossible to keep the waste properly against the bearings. A short time after bearings have been packed, where the feed of oil is by capillary attraction, the waste sags away from the bearings and trouble results.

In the article, you mention in particular: "That the quantities of various lubricants used are followed up very closely by representatives of the oil companies who visit the railway properties. . . ." This is quite true in so far as The Texas Company is concerned, and this detail is considered to the extent of seeing that no extravagance in the use of lubricants occurs, but not with a view of cutting the allowance of lubricants to a point where there is probability of trouble developing.

I also note that 23 railways which you have investigated are reclaiming lubricating oils, which are put to various purposes. Of this number only one road uses reclaimed oil in the same manner as new oil. This is the proper procedure, provided the reclaimed oil is thoroughly cleaned and of straight mineral character. All reclaimed oils can and should be used for the purpose for which the new oil was initially recommended. For other purposes proper lubricants should be furnished. This is the practical and profitable method to be employed and to compensate for the installation of reclaiming outfits.

It is a fact that oils which are properly filtered, having all foreign matter removed, have even greater lubricating values than unused oils. However, this is a matter to which those interested should give serious consideration and confer with those experienced in the physical characteristics, manufacture and application of lubricants. The general effect which lubricating oils undergo through use is principally to increase the viscosity.

Until such time as used oils have emulsified or become rancid, the lubricating value has a tendency to increase through passing off of volatile matter. It will be found that through long-continued use the viscosity may become too high for efficient results. Samples should be taken by the oil companies furnishing lubricants and advice given as to the proper blending with lighter oil, for the purpose of bringing the viscosity to normal again.

On the other hand, seven of the companies mentioned in the survey are using the reclaimed oils for various purposes in connection with truck parts. It is the writer's opinion that this is not at all economical, and as a whole the oils reclaimed are unsuitable for the purposes mentioned, and less expensive and more suitable lubricants could be used. Six of the companies use reclaimed oil for journal bearings. If the oil is properly reclaimed it should also be used for axle and armature bearing lubrication. Three of the companies use reclaimed oil in air compressors. If the oil used for the latter purpose is oil taken from the compressors and reclaimed, it is a practical move but not otherwise. Two companies use the reclaimed oil for lubricating shop tools.

It is a question of the suitability of the oil which has been reclaimed for this purpose, and in the previously mentioned uses of reclaimed oils the latter two companies should also see that the oil is properly cleaned and then used for the same purpose for which it was initially recommended. One railway uses reclaimed oil for freight cars, trolley bases, door engines, automobiles, for track and general oiling. In this instance the use of the reclaimed oils in freight cars is practicable, but for the other purposes mentioned it is quite out of line, and for several of the purposes entirely unsuitable.

Another important matter which must be considered is the use of seasonal grades of oils. These consist of heavy-bodied oils for summer use, in which the pour test is comparatively high, whereas the lighter bodied winter grades of car oils have a pour test at the zero point. The regulation of the use of reclaimed oils as affected by initial physical characteristics can readily be handled so that uniform products can always be at hand for use.

GEORGE R. ROWLAND,
Superintendent Electric Street Railway Sales.

Testing Hangers to Make Sure That Studs Do Not Pull Out

BROOKLYN, N. Y., July 7, 1924.

To the Editors:

The description of the testing laboratory conducted by the Department of Street Railways of Detroit, as published in the ELECTRIC RAILWAY JOURNAL of June 28, gives a method of testing trolley hangers to insure that the studs will not pull out of the insulation when the hanger is heated. A similar test has been used by the Brooklyn-Manhattan Transit Corporation and its predecessors, the Brooklyn Rapid Transit Company and the Transit Development Company, for at least ten years.

There is one marked difference in the requirements of the Detroit and Brooklyn specifications. The temperature required is really the same, 65 deg. C. in Detroit and 150 deg. F. in Brooklyn. The length of time at which the hanger is to remain at this temperature differs, however, in the two companies. In Detroit one hour is specified, while in Brooklyn it is but thirty minutes. A half hour should be long enough to allow the insulating composition to become thoroughly heated and softened and will lessen the time required for testing.

The great difference in the tests is in the pull applied to the stud. While the Detroit specification requires only 100 lb., in Brooklyn the hanger must withstand a stress of 2,000 lb. While 100 lb. is more than the weight of the wire and overhead fittings that the hanger will probably ever have to support, yet the greatest strain on the stud will come, not under normal conditions, but when the trolley pole of a car gets hooked into the wire. To withstand the pull which it then will receive, and yet have some factor of safety, the test of 2,000 lb. does not seem to the writer to be too much.

G. H. MCKELWAY,
Engineer of Distribution
Brooklyn-Manhattan Transit Corporation.

Diameter of Detroit Trolley Wheel

DEPARTMENT OF STREET RAILWAYS
DETROIT, MICH., Aug. 11, 1924.

To the Editors:

It has been called to our attention that in the article regarding trolley breaks in your issue of July 19, the outside diameter of our wheel was shown as 8⅝ in. This is incorrect, as the outside diameter as shown on the blueprint is 5⅝ in.

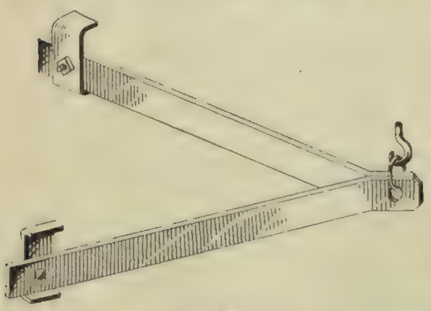
I would appreciate your calling attention to this error.

H. S. WILLIAMS,
Assistant Superintendent of Equipment.

Equipment Maintenance Notes

Steel Frame Relieves Strain on Car Body in Hoisting

AN INGENIOUS arrangement has been devised by H. B. Baldwin, master mechanic Bangor Railway & Electric Company, Bangor, Me., for use in hoisting car bodies in the shop. Almost the entire equipment of this railway consists of lightweight safety cars, and the usual method of raising car bodies in the shop is by means of a QMS crane and a Yale triplex block, as shown in the accompanying illustration. In order to relieve the strain on the car underframe, which would result from attaching the block directly to the bumper, a V-shaped steel framework is used. The two arms extend under the car platform and U-shaped pieces hook over the channels of the car underframe. At the point is a large iron ring to which the hook of the hoist is attached.



Frame Used to Take Strain from Car Body

Raising Cars by Means of a Triplex Block and Special Frame in the Shops of the Bangor Railway & Electric Company

Mounting Grid Resistors to Keep Them Cool

EXPERIENCE has shown that the location and mounting of grid resistors has considerable effect upon the temperature they attain while in service. Since the circulation of air through the grids provides ventilation, it is quite essential in keeping the resistors cool that the individual grids themselves be arranged lengthwise of the car, as the movement of the car then will cause a current of air to pass between the grids. Where it is necessary to mount these near to the wheels or truck it is common practice to install splash guards to keep out wheel wash.

These splash guards shield the grids from air circulation as well as protect them from water, and precautions should be taken to make certain that they are not installed too close to the grids themselves and that as much space as posible is allowed for air circulation.

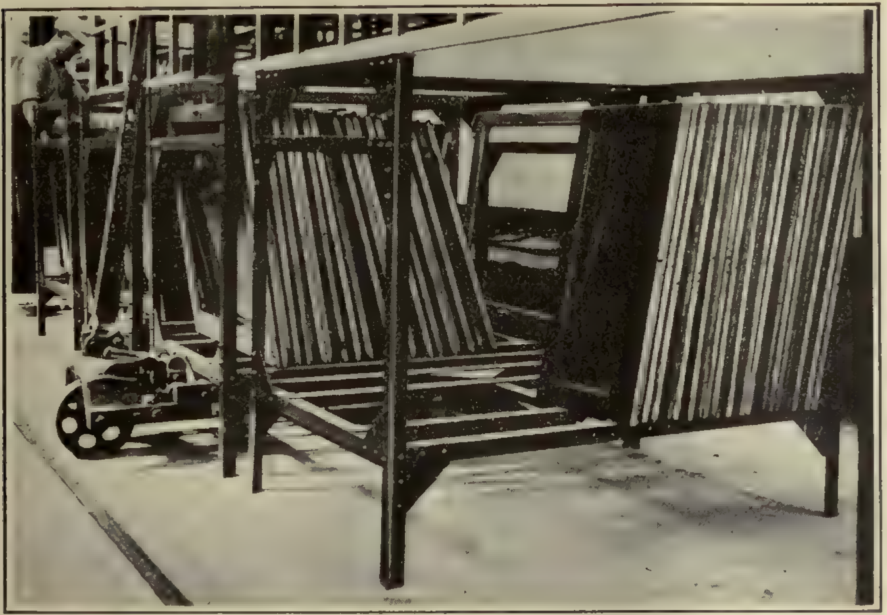
Another point that will assist in keeping the grid resistors cool is to drop them as low as possible underneath the car. This location is not only of advantage for ventilation but also gives more freedom for making the cable connections. In lowering resistors care should be taken not to mount them too close to the rail since there is danger of some high parts striking and breaking the grids. A clearance of at least 10 in. is desirable between the top of the rail and the bottom of the grid resistors.

Convenient Racks for Handling Car Sash

RACKS for storing and transporting car sash have been found particularly useful for overhaul work in the shops of the Department of Street Railways, city of Detroit, as mentioned briefly in the issue of this paper for July 5.

These racks are made up of 1¼-in. x ⅛-in. angle framing, riveted together and braced at the corners by small gussets. The vertical members are carried down to form short legs and, as shown in the accompanying illustration, the horizontal top angle is omitted from one side to facilitate stacking and removing the sash. In the bottom framing two horizontal flat steel strips are placed to form a support for small upper sash as well as for the larger size lower sash. The racks are of sufficient size to take a full set of sash for a car.

Cowan lift trucks are used to



These Racks Are Used in the Detroit Shops to Carry Complete Sets of Car Sash

transport the racks about the shops. They are run under the racks, as shown in the accompanying illustration.

When a car is stripped for overhauling all of the sash are stacked in one rack. They are then transported in complete car sets to the cabinet shop, where any necessary repairs are made. After this work is completed, the rack with its complete set of sash is transported to the paint shop. By using small wooden wedges between the upper edges of the sash they can be readily stacked directly in the racks after being refinished and are then transported back to the car from which they were taken. The use of racks of this type reduces the amount of handling to a minimum and avoids broken glass and other damage.

Simplifying Air Hose Assembly

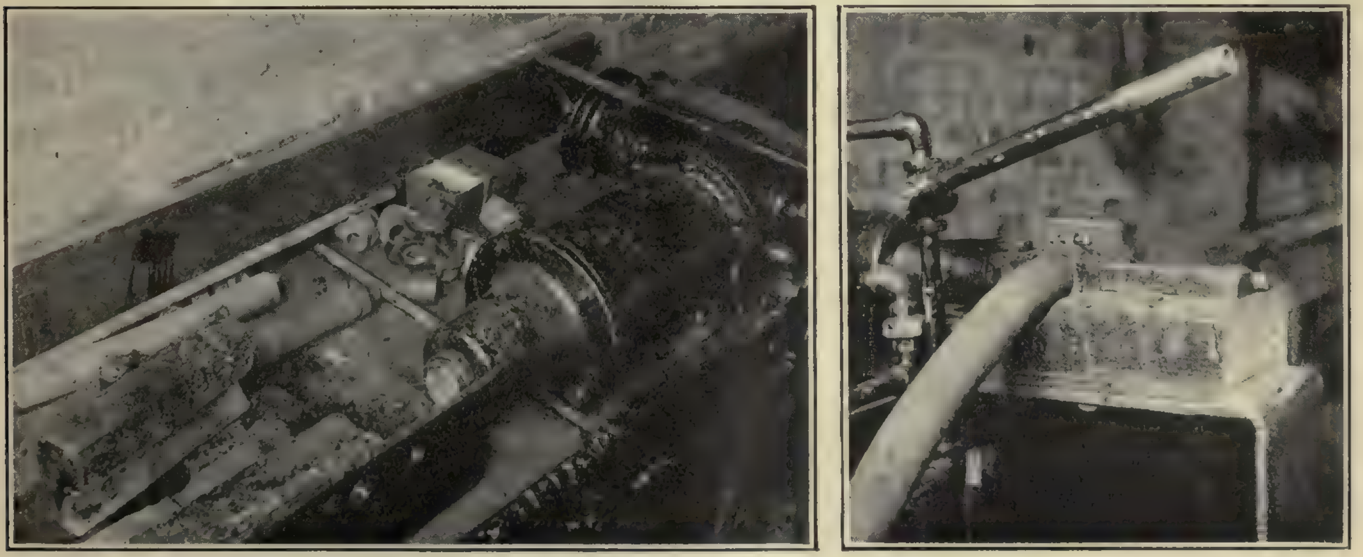
The task of assembling air hose has been simplified in the shops of the Illinois Traction System at Decatur by applying fittings to each end of the hose and placing a band around to reinforce the connection. These operations are performed by pneumatic machines. One forces the fitting into the end of the hose, and another shrinks the clamp in position while the clamp bolt and nut are inserted.

The first apparatus consists of two parts. A holding device has a movable jaw 10 in. long grooved out to fit the hose, which is brought up against a similar stationary jaw. The movable jaw is actuated by air admitted to an 8-in. x 12-in. brake cylinder, the piston rod of which is connected to a toggle link mechanism. The movement of the piston closes the jaw while a spring returns the mechanism to its original position. Directly in line with the longitudinal hole formed by the closed jaws is another 8-in. x 12-in. brake cylinder with a blunt ram on the end of the piston rod. This is used for forcing the fitting into the hose while it is held in position by the jaws.

This apparatus is also used for removing fittings from old air hose. After the fitting clamp has been removed, the hose is clamped in position, a piece of small diameter pipe placed through the hose, and pressure applied to the end of the pipe by the cylinder used to press in fittings. The coupling fitting is removed first, then the hose is reversed, and, after a pipe cap has been screwed onto the threaded fitting, this fitting is removed.

After the fitting has been inserted, the hose is placed in the second apparatus. This consists of another 8-in. x 12-in. brake cylinder having a curved die, mounted on the end of the piston rod. When extended, this die meets a similarly-shaped concave anvil, curved to receive the hose. The binding clamp is placed in the proper position around the hose and the hose inserted between the jaws of the apparatus. Pressure is applied by admitting air to the cylinder, and with the clamp squeezed as tightly as possible the retaining bolt is inserted and the nut made tight.

With these two pieces of apparatus the shops are able to turn out 1,000 1⅜-in. standard A.R.A. complete air hose in three days. This work is



At Left, Brake Cylinder Used to Force Fittings into Air Hose. At Right, Jaws Hold Retaining Clamp Shut Until Nut Is Tightened Up on Fastening Bolt done for the stores department, the complete hose being requisitioned when needed in the shops.

Dirt Track Foundation in Portland

ON SEVERAL recent track rebuilding jobs the Cumberland County Power & Light Company, Portland, Me., has successfully used the old dirt foundation underneath its ties. A usual type of construction of this railway embodies 6-in. 100-lb. T-rails, wood ties, and granite block paving. Where the track has been in service many years and the ground is firmly packed under the ties no ballast is used in reconstruction work. The old ties are allowed to remain in place and new rails laid directly on them. Elsewhere, when needed, rock ballast is used for the track foundation.

Track in Portland Paved with Granite Block Inserted Under Rail Head

No Ballast Is Used Under These Ties, Which Rest on a Dirt Foundation

Concrete is poured between the ties up to the approximate level of their tops. Granite blocks are inserted under the head of the rail. By carefully selecting the blocks to get the larger sizes in the center of the track, the pavement is given the necessary crown. This type of rail and pavement is extensively used in Portland and has proved entirely satisfactory not only to the railway, but also to other users of the street.

A Summons for Dick Prescott

And He Answers With Some Misgivings

FOR several days following Mr. Milburn's visit, there was a feeling in the shops of the Consolidated Railway & Light Company that important changes were imminent. Nobody, however, knew what to expect.

In the brief period since coming with the company as its general manager, Mr. Milburn had shown a firm hand in instituting various changes in the practices of several of the departments. His courteous manner, coupled with obviously wide experience and mature judgment, had made a very favorable impression on the various department heads, and he was well along toward receiving full co-operation from them.

Thomas Mullaney alone had held aloof. While called general foreman of the shop, he actually was the superintendent of equipment. Previous changes in management had had little effect on his department. Usually the general manager had been too busy with other things to pay much attention to the shop, and Mullaney had visited the head office only on rare occasions.

Mr. Milburn's unannounced visit was a wide departure from precedent. His manifest interest in the shop equipment and methods gave each foreman an unusual thrill of pleasure and importance. His declared intention to follow the department's activities closely caused general comment and speculation.

During the several days since this visit, Mullaney himself seemed changed. A long conference in his office had followed the trip through the plant, and since them Mullaney had put in much of his time in the shop. He had suddenly become critical of existing practices and seemed unusually interested in suggestions for improvements. His stock reply of "We tried that 15 years ago," or "This has been good enough for 20 years, why change it now?" was strangely absent when the various foremen mentioned possible improvements.

Steve White, carpenter foreman, was delighted with the new trend of events, but still he felt uneasy about his spirited conversation with Mullaney, part of which at least he felt had been overheard the day Mr. Milburn had appeared unexpectedly in the shop. But Mullaney said nothing further on the matter.

Meantime, Dick Prescott, in his capacity as carpenter's helper, was outside the circle of active discussion of impending events, except as the men in the ranks noted and commented on obviously changed conditions. Dick had rapidly made friends among the men with whom he came in contact, even including some of the foremen. He had taken his place as a carpenter's helper with a willingness and cheerfulness that impressed those about him. No task seemed too small to be done well, and no man seemed too lowly to receive a cheerful lift if Dick was near by. During the lunch hour he joined the various groups, and was soon sought after to join in sports of his associates or to give an opinion.

Steve White had taken a particular liking to Dick. So when, several mornings after Mr. Milburn's visit, a telephone call came to have Dick report at once to Mullaney, he conveyed the message with some misgiving. Such a summons to Mullaney's office in the morning had never, to Steve's knowledge, been the occasion for rejoicing.

Dick was helping old Bill Newman, the carpenter, lift a heavy corner post into place when Steve called him aside.

"The old man wants you in the office," said Steve.

"Wants me?"

"Yes, said he wanted you there right away."

"All right. Thanks, Mr. White," said Dick. "Then I guess I'd better start right over. Somebody will have to give Bill a hand," and he nodded in the direction of the old carpenter, who stood waiting. "Those posts are pretty heavy."

"Go ahead," replied Steve, "I'll take care of that."

Dick swung briskly off, anxious to make a good impression by being prompt. As he entered the outer office, the sullen-faced clerk at the timekeeper's window stared at him curiously.

"Mr. Mullaney sent for me," said Dick. "Is he busy now?"

"Knock on the door and you'll soon find out," was the ungracious reply.

Dick approached the heavy door to Mullaney's office and rapped firmly on the panel.

Electric Sand-Drying Apparatus Used by the Massachusetts Northeastern Street Railway

Electric Sand Dryer

A SIMPLE and convenient apparatus for drying out sand used on the cars of the Massachusetts Northeastern Street Railway has been designed by Harry Osgood, master mechanic, and installed at the company's shops, Salem Depot, N. H. A rectangular wood bin, about 2 ft. high, was built parallel to and between a pair of tracks in the carhouse. Near the top of this bin six old-fashioned electric car heaters were placed crosswise. Above them is a wide-mesh screen surrounded by 8-in. boards placed on edge. Wet sand is heaped on top of the screen, the heaters are turned on and as the sand dries it drops down into the bin. Trainmen desiring to secure sand for their cars obtain it through one of three sliding doors to the bin by means of a bucket and shovel.

Some Precautions in Rewinding Armatures

GREAT care should be used in rewinding armatures to guard against failure in service. Sharp corners and rough nicks in the slots which might damage the coils should be filed down. All chips and filings should be removed carefully before attempting to apply the insulating material to the coil. The coil itself should be a tight fit in the slot and should be wound so that its top is $\frac{1}{32}$ in. above the band grooves. Fillers should be used between the top and bottom coils if necessary to get the correct position. By having the coils extend above the band grooves they will be pulled down tight when the bands are applied. The bands, however, should rest on the iron in order to prevent movement in service. If the coils are wound too high the bands will not rest on the iron, and when the insulation dries out in service the bands will become loose.

While placing the coils in the slot they should not be twisted or abused any more than is absolutely necessary. Care should also be taken to avoid crossing of the leads in such a manner that when pressure is applied there will be danger of a short circuit. The ends of coils should be forced down against the coil supports so as to make a solid foundation for the bands, but pounding should not be carried to the extent that the coils or leads are damaged. The tool used in driving the leads into place should be free from sharp corners that might nick the leads and result later in broken wires and open circuits.

Insulated protecting sleeves should be placed at all points where the coils cross and where there is danger of short circuits. The cotton sleeving used on the leads should not be allowed to get into the commutator slot, as it may prevent soldering.

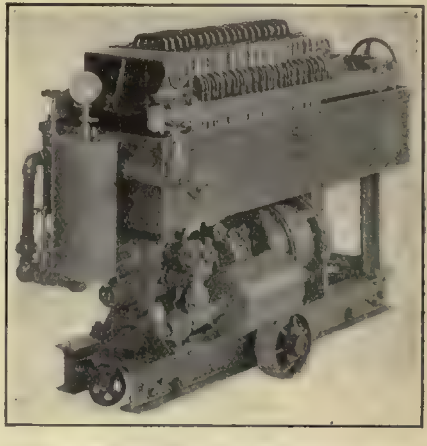
New Equipment Available

Improvement in Oil Filter Presses

AN IMPROVEMENT in the oil filter press manufactured by the General Electric Company is the addition of an air bell for testing suction piping so as to avoid freely mixing air with the oil as it is being purified. This is undesirable in most modern types of power transformers which are equipped with special tanks to keep the air out of solution in the oil, thereby greatly prolonging its life and assuring its efficient operation.

Leaky suction pipes and joints in pipe lines to the purifier have heretofore been one of the most difficult conditions to guard against. To facilitate precautions against such leaks all G-E oil filter presses are equipped with air bells which provide a simple and convenient means for testing the tightness of the suction piping, pump stuffing boxes, etc., before filtration is begun.

The air bell is so arranged that it can be pumped up to the shut-off pressure of the filter press pump. After the suction pipe valve is closed at the transformer drain the pump is stopped and the stored air pressure is automatically released against the oil in the suction piping. If this piping, the pump stuffing boxes, etc., are in good condition, it is possible to hold the pressure of 20 lb. or so for several hours, although 10 or 15 minutes will be sufficient to test, as any leaks will generally show up immediately. Leaks will now be outward and will show oil coming through so that they can be readily located and corrected. The actual pressures obtained during this test depend upon the relative volumes in the air bell and the suction piping, and hence will vary somewhat with the conditions of the installation. Air bells are available as supply material for equipping existing filter presses with this new feature.



Oil Dryer and Filter With Capacity of 25-30 Gallons per Minute

Electric Furnace for Heat Treatment

A NEW industrial hearth-type electric furnace for operation up to 1,850 degrees Fahrenheit has been recently perfected by the Westinghouse Electric and Manufacturing Company. These furnaces, known as type B, are made with hearth sizes ranging from 4 in. wide and 10½ in. deep to 12 in. wide and 36 in. deep. They are suited for such operations as annealing, hardening, tempering, normalizing, carbonizing and case hardening. Automatic temperature control makes it possible to duplicate heating conditions and enables a predetermined manufacturing schedule to be carried out.

Electric Furnace with Control Pyrometer

A distinctive feature of this new furnace is that the muffle plates, which completely inclose the heating chamber, are perforated so that heat is radiated directly from the heating element to the charge. This unusual construction permits a high temperature in the heating chamber without undue deterioration of the heating elements. These elements, which are S-bend coils of nickel-chromium wire, are placed on all four sides of the heating chamber and are supported and aligned by molded studs on the muffle plates.

The door of the type B furnace is suspended by a chain from one point. The operating handle is counterweighted so that the door opens or closes easily and will remain in any position. Angles bolted to the guides hold the door closely against the front casting but allow it to move easily.

Standard insulating bricks next to the shell are supported by the high temperature insulation, which is in the form of slabs, relieving the muffles of the weight of the insulation. The furnace shell, or casing, is of heavy sheet steel, with the sides and bottom in one piece. The top, however, is a separate piece to facilitate removal for repairs to the insulation or heating element.

The rear casting design is a frame supporting an asbestos panel through which the ends of the heating coil protrude. Heavy air-cooled connectors join the coils in series and connect to the lines.

The automatic control of this furnace enables the operator to maintain a desired temperature indefinitely. In the control instrument, a stationary pointer carrying two electric contacts is set at the desired temperature and the furnace turned on by a conveniently located push button. As the temperature rises, an indicating hand moves along the scale. When it reaches the upper of the two contacts carried by the stationary pointer, the relay is energized, opening the magnetic contactors and cuts off the current. When the temperature falls to the point where the indicating hand reaches the lower of the contacts on the stationary pointer, the relay cuts the current on again. By this means the temperature may be kept within limits of approximately 1 per cent without any attention on the part of the operator.

Red Lead-Graphite Primer

THE Joseph Dixon Crucible Company, Jersey City, N. J., has placed on the market another paint product known as Dixon's red lead-graphite primer, after tests lasting for over a year. The pigment of this primer consists of flake silica-graphite, red lead and high grade oxide of iron. The vehicle is boiled linseed oil. The primer will dry perfectly in 22 hours under normal conditions and will cover approximately 400 sq. ft. to the gallon on metal surfaces.

The new primer is said to have qualities of red lead together with the well known water-repellant advantages of a silica-graphite paint. Under application it lessens the "drag" on the painter's arm and is not so severe on the wearing qualities of the brush as red lead. It will not chip nor scale off, has greater covering power than red lead, and costs considerably less.

Reflector Specially Designed for Bus Lighting

A REFLECTOR designed especially for 21-cp. lamps used in bus lighting has been placed on the market by the Ivanhoe Division of the Miller Company, Cleveland, Ohio. This reflector is of light opal glass, which allows about 30 per cent of the light to be transmitted through it for general illumination and to light up the advertising racks. The reflector is comparatively deep and shields the lamp well. Approximately 65 per cent of the light is directed downward. The construction of the holder is extremely simple, and the usual fastening screw has been eliminated, thus reducing the likelihood of noisy rattling. Two types of reflector have been designed, one for use where the roof is flat, and the other where the roof slopes.

Opal Glass Shade for 21-Cp. Bus Lamp

Asphalt Composition Rail Filler

THE Philip Carey Company, Cincinnati, Ohio, is putting on the market a rail filler of specially tempered asphalt composition. This acts as a resilient cushion between the rail and the pavement, absorbing traffic impact, rail vibration and traffic noise. It comes ready formed to fit any rail section and is readily shaped to fit any track curve. Moisture or temperature changes do not affect it.

The new rail filler is made to extend a short distance beyond the rail itself, so that the paving is laid not against the steel rail but against the filler, being thus cushioned against impact with the rail. The cost of installation is extremely moderate, as one man can place it in position with a mallet.

Association News & Discussions

Improvements in Motor Car Design*

Trends in the Design of Electric Railway Rolling Stock Considered from the Standpoints of First Cost and Maintenance—Bodies, Running Gear, Ball and Roller Bearings, Brakes and Other Parts Discussed

By H. Dubath
Engineer Swiss Industrial Company, Neuhausen, Switzerland

FROM the point of view of the running gear, double-truck cars present less variety than single-truck or two-axle cars. The two-axle cars are from 23 ft. to 33 ft. over bumpers, with wheelbase varying from 5 ft. 6 in. to 9 ft. or occasionally as high as 11 ft with radial axles. With wheels of 31-in. to 37-in. diameters, as commonly used in Europe, determined by the size of the motors, the wheels are sometimes projected into pockets in the car floor. This arrangement is not held in much favor, drop platforms for the purpose of lowering the step height being considered preferable.

In many of the older car designs common in Europe the axles are supported directly from the body. In this type the point of attachment of the platform is always relatively weak, and requires heavy reinforcement.

The Americans were the first to build two-axle cars with the running gear separate from the body. This construction has numerous advantages, particularly due to the spring support of the greater part of the weight and to ease of repair, but it is heavy, the dead weight per passenger being in the neighborhood of 660 lb.

Replies to a questionnaire sent out by the author indicate that the large number of available types of trucks hinders the development of pressed steel designs, since the expense of dies limits the application to quantity production. It is not felt that the use of pressed-steel trucks increases the difficulty or importance of repairs. With the use of autogenous and electric welding processes repair work is facilitated and the total cost is likely to be less than for a running gear assembled of standard sections. Pressed steel for fabrication of trucks in quantity permits an economical proportioning of material, thus making possible a reduction in weight of the truck that may reach 20 to 25 per cent.

Light metals may be used advantageously for the purpose of reducing the weight of the truck in the construction of small trailers. For motor cars, however, the reduction in weight cannot be obtained without jeopardizing the strength and solidity of the truck. Light metals are useful for small parts and accessories where strength is not a controlling factor.

Elasticity of Body Suspension

The number of different spring suspensions of motor cars is in proportion to the importance of the subject. Laminated, helical and conical springs are all used. A good suspension should be cushioned, should have sufficient working range, and should be damped in action. Laminated springs alone combine these qualities. Helical springs are used frequently over the journal boxes, but this faulty construction is being abandoned.

Although satisfactory tests have been made of greasing laminated springs, the results do not justify extension of the practice. The collected dirt on the leaves cannot do other than harm their action. Furthermore, it is necessary to use leaves of special design, which increases considerably the price of the springs. It is believed that careful cleaning and lubrication of the leaves with oil and graphite will suffice to maintain the flexibility of the springs. Inspection of springs in service, however, indicates that frequently the laminations are allowed to rust in their guides, completely destroying the flexibility of the springs.

Laminated springs should have their leaves as long as possible, with very large section, assuring a stable suspension. For use in cars where the running gear is suspended from the body, or in the case of swiveling trucks without side play, the spring hangers may be connected through small helical springs carried in telescoping cases. This arrangement absorbs the minor shocks in order to reduce the movement of the leaves so that the latter may be supported directly from the body.

The exact calculation of axle stresses is not simple, for it is not possible to determine closely all the forces acting. Various experiments have now made it possible to establish an empirical relation taking account of all the influences. Breaks due to faulty construction or too small dimensions are relatively very infrequent. They start most frequently from flaws in the material resulting from molecular strain in consequence of the continued shocks sustained by the axle in service, and the breaks occur after a considerable number of miles have been traveled.

The use of high-quality steel is demanded in the manufacture of axles. Despite the high price of special materials, nickel steel and chrome-nickel steel have been tried by many companies with satisfactory results. The only exception is the railway in Algiers, which tried without success axles of 2 per cent nickel steel having a tensile strength of 62,000 lb. and 25 per cent elongation. These axles cracked when the distance run was only about 9,500 miles. This bad result is due undoubtedly to the poor quality of that particular steel.

Chrome-nickel steel is but little used on account of its high price. Its excellent qualities should now permit a reduction in size of the axles. This has been tried in the new cars of the Paris system.

In the following table are presented the characteristics of various special steels used in axles, as furnished by the technical head of the Swiss Railway Commission on secondary railways. These figures correspond quite closely with those furnished in response to the questionnaire sent out by the author:

Type of Steel	Siemens-Martin	Crucible	Nickel	Chrome-Nickel
Tensile strength, lb. per square inch....	70,000–85,000	85,000–100,000	85,000–100,000	100,000–114,000
Elastic limit, minimum, lb. per square inch....	50,000	57,000	62,000	71,000
Elongation, with a length between supports of 10 diameters, per cent.......	20	18	18	15
Elongation, with a length between supports of 5 diameters, per cent........	24	22	22	18
Reduction in area, per cent........	45	45	45	50

The following table gives current practice regarding the material used for the body of solid or spoked car wheels:

Type of Wheel	Spoked Wheels			Solid Wheels		
Material	Cast Iron	Soft Steel	Steel Casting	Soft Steel	Soft Steel Rolled	Steel Casting
Tensile strength, lb. per square inch....	50,000–57,000	48,300–58,300	54,000	57,000	52,600–62,500	54,000
Elongation for length of 10 diameters, per cent..........	18	25	20	20	20	20
Elongation for length of 5 diameters, per cent..........	18	..	..	24	24	..
Reduction in area, per cent......	35	50	.	50	45	.

Tires are most frequently made of Siemens-Martin steel, occasionally of crucible steel or electric furnace steel. The properties of the former materials are shown in the following table:

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*Abstract of a paper presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

	Motor Cars		Trailers
Tensile strength, lb. per square inch	100,000–114,000 or	114,000–128,000	92,400–106,600
Elongation for length of 10 diameters, per cent	15	13–12	16
Reduction in area, per cent	30–40	30–40	30–40

For tires, the same authority quoted above states that the material is satisfactory if the product of the tensile strength in lb. per square inch and tha elongation is equal to or greater than 1,400,000. For the bodies of solid wheels with solid tires this is considered satisfactory, while cast steel should have from 70,000 to 85,000 lb. per square inch tensile strength with 12 per cent elongation and 30 per cent reduction in area.

The tendency is to permit the use of very hard tires having a tensile strength of 106,000 lb. per square inch or over. Tires of this sort may exert an unfavorable influence on track maintenance if the quality of the rails is inferior and if the curves are not carefully maintained. The outer rail may be seriously damaged, particularly where there is no spiraling at the entrance. This has been the experience of a number of companies which have used tires of a tensile strength from 107,000 to 114,000 lb. per square inch.

BALL AND ROLLER BEARINGS

Only the results will be cited briefly of various trials and experiences in service with ball and roller bearings. In 1921 the Swedish State Railways supplied roller bearings to a series of ore cars with a light weight of 12.7 short tons and a weight fully loaded of 38.6 tons. In the course of a series of experiments made under similar conditions and comparing with ordinary friction bearings, the following results for train resistance were obtained at a speed of 25 miles per hour: For a car provided with ball bearings, 2.12 lb. per short ton; with friction bearings, 3.28 lb. per ton. This corresponds to a reduction of tractive effort of about 38 per cent in favor of the ball bearings. The starting resistance is reduced enormously, being not over 10 to 15 per cent of that obtained with cars having friction bearings. The tonnage of a train can be increased some 35 per cent without causing an overload on the motor.

Tests made on the tramways of Schaffhouse, Switzerland, have given equally favorable results with ball bearings. These tests, made in August, 1921, with a single motor car weighing 13.65 short tons and loaded with 2.2 tons showed a reduction in train resistance of 40 to 50 per cent, while the starting resistance was not over 35 per cent of that of the same motor car provided with friction bearings.

Unfortunately, the theoretical advantages of ball bearings are not sufficient to overcome the drawbacks. The high cost, about 2.4 times that of ordinary friction journal bearings, the breakage of balls, the abnormal wear on the journals following the rotation of the ball race and scoring of the ball race following shocks, are among the troubles which have caused an increase in expense of operation.

Summarizing, the author considers that ball bearings, on account of their delicacy, are not suitable for use in rolling stock.

Roller bearings are in use on several Swiss tramways, while others are waiting for the necessary funds to proceed with the substitution. A series of tests were made in March, 1923, by the German Rolling Stock testing department, of a car equipped with roller bearings. This test car, with a light weight of 53,600 lb. and carrying normally a load of 110,000 lb., was provided with roller bearings. The tests consisted of projecting the car against a shoe fastened to the rail, or against a loaded tender, at speeds of impact from 7 to 22 miles per hour. While in one case the impact was so severe that the end of the car was damaged, the roller bearings were in perfect condition throughout the test and after its completion. Measuring the bearing with a micrometer there was no deformation whatever, neither of the rollers or of the race.

For the use of roller bearings in electric cars it is not considered necessary to provide a special electrical contact between the journal box and the axle. The Swiss tramway companies and light railways, which have adopted roller bearings, have found the contact quite sufficient.

The cost price of the complete journal box for roller bearings is about 2.5 times greater than that for an ordinary friction journal box, although this may be reduced in quantity production. From the operating standpoint the economy of lubricants and the reduction of handwork in maintenance justify their adoption even at the present price.

MECHANICAL BRAKES

The brake rigging used on tramway and light railway cars is in general heavy and complicated, and the cost of maintenance is always high. This latter may be reduced materially by the use of pins of tempered steel and by attaching a rod on the brake rigging to the journal boxes. The higher first cost of this arrangement will be quickly balanced by reduced cost in service. Then, also, the repair of the wearing parts on the rod by acetylene or electric welding will be found economical, and the use of steel bushings, at least in a number of cases, will be found advisable.

The necessity of reducing the dead weight of motor cars in particular, has led to experiments on the application to rolling stock of the principles now found in the design of automobile brake rigging, with braking by means of a drum placed on the axle.

The advantage of a brake drum for a motor car is that it may be placed in such a position as to reduce the initial force necessary to obtain the braking effort, and consequently permits a reduction in the weight of the brake rigging. This simple reason leads to the solution applied on automobiles, that of placing the drum on the motor shaft. [As an example of this style of brake rigging, the author makes reference to the Paris cars which were described in ELECTRIC RAILWAY JOURNAL, for Dec. 2, 1922, page 878.—EDS.]

Comparing the modern cars with the older ones, their simplicity and harmony of lines is noticeable. This has been accomplished by the elimination of useless accessories and simplification of shapes, all of which have gone to reduce the weight of the cars. Framing of wood is used in general, oak being the preferred material.

Panels are usually made of black sheet iron or of wood. In many cases sheets of aluminum of 1.5 mm. thickness have been used but the results have not been entirely favorable. Along the seashore the metal does not resist salt air very well and in some cases has been replaced with wood.

Another interesting result noted is the decomposition of the aluminum sheets at points where they are in contact with iron, the aluminum being reduced to powder in a few years. In Switzerland aluminum has been adopted for sheathing by many companies with good results. The weight of aluminum sheathing is about one-third that of iron, notwithstanding the greater thickness of the panels. The price is about 50 per cent more than that of sheet iron. The painting, however, is simplified and the paint is more durable on account of the absence of rust. In order to make the paint adhere well to the aluminum sheets they should be roughened with sand paper.

TRAIN SIGNALS

The management of the Zurich Tramways has tried a new system of transmission of signals between conductors of motor and trail car and the motorman, and has introduced with success an optical signal invented by H. Schaub, assistant engineer of the company.

The signals are given by means of lamps with colored lenses mounted in parallel on the trolley circuit. On each platform, motor car or trailer, a mercury switch is placed against the bulkhead so that its motor shaft projects through and permits the conductor to give the signals from the interior. The signal lamps are placed on each platform before the motorman.

The red lamps correspond to the motor car, and the green ones to the trailer. Signals are given in the following manner: (1) While the train is running the lighting of the red or green lamps or both indicates "stop at the next regular station." The start is not made until the lamps are all extinguished. (2) Successive lighting and extinction of either red or green lamps signifies "stop immediately" as signaled by one or the other conductor. As in the first case, the train is not started until all the lamps are extinguished.

On account of the frequency of operation (about 1,000 per day) it is necessary to use a special type of mercury switch. This has given excellent results, and has been tested up to four million of interruptions.

METALLIC CAR FRAMING

The considerations that have led to the construction of cars entirely of steel in America for car bodies of subways, suburban steam railways and later by large railway companies do not apply with equal importance to rolling stock for tramways or light railways. The design is very much less. Likewise the effect of speed on these latter in the danger of telescoping does not exist to the same degree. The results on the cost of maintenance, however, may justify in itself this form of construction.

In Switzerland the Geneva Tramways placed in service in 1920 a set of 10 double-truck trailers, weight 11.65 short tons, seating 34, and having a total capacity of 64, being 363 lb. per total passenger. The frame is formed of pressed sheets 3 mm. thick, the sheets of the sheathing being of Siemens-Martin steel 2 mm. thick, those of the platform 2.5 mm. The posts and the car lines have furring strips of wood on the inside to which the sheathing or headlining is attached. To avoid rusting the frame and the running gear have been protected by the Schoop process.

ONE-MAN CARS

Since the very complete report on this subject presented at the last congress by P. M. Nieuwenhuis, manager of the Arnhem Tramways, various companies have investigated the question. Everywhere the authorities have taken the point of view that safety of the system with variable fares does not make the extension of the use of this type of motor car desirable, yet one-man cars have been placed on certain lines of light traffic.

STANDARDIZATION OF MATERIALS

The standardization of materials, desirable from all points of view, has encountered great difficulties. The enormous number of types of motor cars and trailers is evidently the natural consequence of varied and particular conditions of development in each system. Had the principle of standardization of materials been considered in the original plans, the promoters would have in a number of cases adopted approved types and exercised a good influence in the selection of material. Considerations often quite secondary have led to the opposite result, and the number of car types is growing greater and greater.

Today, the idea of standardization of material has made great progress. The ideal would be to limit the number of types to a few. The management of the electric railway of Little-Roubaix-Tourcoing gives the following statement on the subject:

"If we consider the city and interurban tramway systems, except Paris, it appears that the types of cars necessary may be reduced to four:

"A two-axle city type motor car of 42 to 45 passengers capacity, with two motors of 35 hp. each and a total weight of 10 (metric) tons;

"A two-axle city type trailer of the same capacity, weighing 5 tons;

"A double-truck interurban type motor car of 55 to 60 capacity, with power determined by the demand;

"A double-truck interurban type trailer of 55 to 60 capacity.

"In the case of those concerned with the two former types, the leading question is the wheelbase, which may not be settled easily, not all parties being agreed on the possibilities of a car with two rigid axles and a wheel base of 3.5 m. (11 ft. 6 in.) going around curves of 18 m. (60 ft.) in an economical manner."

For motor cars, this last point is solved in a very satisfactory manner by the elastic suspension as used in the light motor cars of the Paris system, the motor not being mounted on the truck.

But standardization does not apply alone to new equipment, and first cost and maintenance may be reduced proportionally by the standardization of the principal car parts.

On the Swiss tramways and light railways alone, we have taken account of at least 100 types of tires, for example. Under such conditions, replacements are very costly, and the delays in delivery are always very long on account of the low tonnage requirements. It is therefore indispensable to work for standardization of these and similar parts, to permit manufacture in quantity.

Excepting for the electrical equipment the author proposes the standardization of the following parts:

Axles, wheel bodies, tires, journal boxes, suspension springs, brake rigging, brake beams, brake shoes, couplers, parts of the car body framing, truck parts, pressed steel parts, glass and window frames, ferrules, etc. This will have not only a favorable influence on the first cost and on the maintenance of these parts, but also on the weight of the car. Standardization of this sort is particularly desirable for the smaller companies which find it impossible to obtain the advantages of construction of cars in quantity on account of their limited requirements.

REDUCTION OF CAR WEIGHT

As shown in this paper there are several factors that can produce a reduction in car weight. The dead weight carried per passenger is evidently too great, especially for tramway motor cars. Thus the mean established for the motor cars of 13 companies responding to the questionnaire give the following proportions: Weight empty, 14.2 short tons; seats, 28; total passengers, 56; giving a dead weight per seat of 1,015 lb. and of 508 lb. for all passengers.

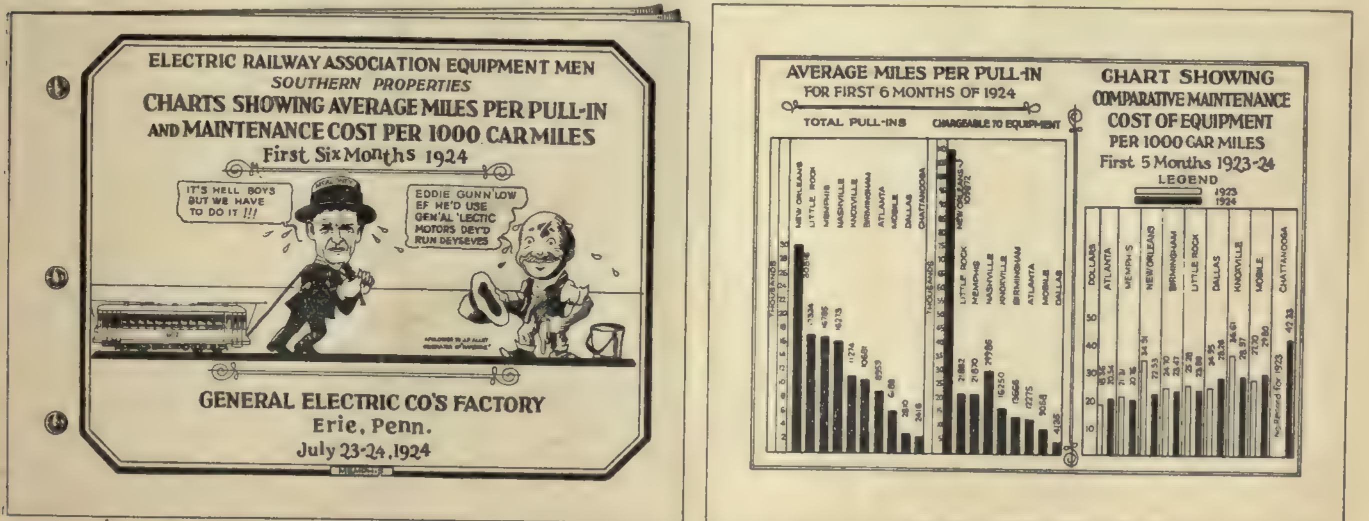
In Switzerland the average of all tramway motor cars is less favorable. This is due principally to the heavy grades, necessitating extra strong brake rigging, magnetic track brakes almost universally adopted, a very strong construction, capable of standing frequent and prolonged brake applications. The average figures follow:

Weight empty, 11.3 short tons; seats, 18; total passengers, 35; being a dead weight of 1,250 lb. per seat and 645 lb. with respect to the total carrying capacity.

The new light weight motor car, Type L, of the Paris system, has a light weight of 13.8 short tons; seats, 30; total capacity 49; dead weight per seat 920 lb.; dead weight per passenger 563 lb.

Southern Equipment Men Mix Fact and Fancy

A FEATURE of the meeting of the Electric Railway Association Equipment Men, Southern Properties, held at Erie, Pa., July 23 and 24, 1924, was the attractive booklet distributed to the members present. Fact and fancy were judiciously mixed in the preparation of this booklet. The front and back covers showed W. H. McAloney, superintendent of equipment Georgia Railway & Power Company, Atlanta, Ga., and J. M. Kington, master me-



ELECTRIC RAILWAY ASSOCIATION EQUIPMENT MEN
SOUTHERN PROPERTIES
CHARTS SHOWING AVERAGE MILES PER PULL-IN AND MAINTENANCE COST PER 1000 CAR MILES
First Six Months 1924

GENERAL ELECTRIC CO'S FACTORY
Erie, Penn.
July 23-24, 1924

Front Cover and One of the Interior Pages of Southern Equipment Men's Booklet chanic Knoxville Power & Light Company, Knoxville, Tenn., in characteristic poses. The interior of the booklet was devoted to charts showing the average miles per pull-in and the maintenance cost per thousand car-miles on the various railways connected with the association.

Pacific Claims Men Discuss Safety Measures

STAGING of a general "accident prevention day" on the Pacific Coast, advocation of compulsory liability insurance for all autoists, concrete suggestions for new traffic rules, standardization of accident reports in all cities and recommendation that new autoists be required to pass examinations in order to obtain new licenses were the principal topics of discussion at the fifteenth annual convention of the Pacific Claim Agents Association, Spokane, Wash., June 23-25.

S. A. Bishop, general claim agent Pacific Electric Railway, was elected president of the association, to succeed P. O. Solon of Oakland, Calif. Other officers elected are V. F. Bennett, first vice-president; C. R. Peck, second vice-president; F. J. Furman, third vice-president; and B. F. Boynton, secretary-treasurer. The new executive committee consists of J. H. Handlon, chairman; Colonel Thomas G. Aston, H. G. Winsor, W. H. Moore, C. A. Blackburn, F. D. Oakley, H. K. Relf, A. M. Lee, C. M. McRoberts and P. O. Solon.

Internationaler Strassenbahn und Kleinbahn Verein

THE program for the convention of the Internationaler Strassenbahn und Kleinbahn Verein, or the Association of Street and Interurban Railways in the central countries of Europe, has just been made public. The convention, as already announced in the paper, is to take place at Homburg, v.d. Höhe Sept. 4 to 5. A list of the papers to be presented and their authors follows:

1. "Operation of One-Man Cars and Their Possibilities in the Way of Reducing Platform Expenses"; by Mr. van Putten of Amsterdam and Mr. Hultman of Malmö.

2. "The Automobile in Supplementary Service to Interurban Railways"; by Mr. Geiser of Schaffhausen.

3. "Rating Transportation Employees on the Basis of Car Miles Operated per Year"; by Mr. Nórregaard of Copenhagen.

4. "Determination of a Reasonable System of Fares for Street Railways"; by Dr. Patz of Budapest.

5. "Track Construction and Maintenance": by Mr. Goetz of Leipzig.

6. "Standard Sections for Girder Rails"; by a member of the committee on standards.

7. "Magnetic Track Brakes"; by Mr. Barth of Christiania.

8. "Controllers and Control Sys- by Mr. Pforr of Berlin.

9. "Practical Experience with Self-Ventilated Motors"; by Mr. Nier of Dresden.

10. "Roller and Ball Bearings for Electric Motors and Car Journals"; by Dr. Videky of Budapest and Mr. Pforte of Hagen.

11. "Fares in Non-Expanding Territories"; by Mr. Winter of Vienna.

The business session of the association for the election of officers, etc., will take place on the afternoon of Sept. 5. On Sept. 6 and 7 the German Street and Interurban Railway Association will meet.

American Association News

Plans for Annual Convention

ARRANGEMENTS for the Annual Convention to be held in Atlantic City Oct. 6-10 are progressing. Nearly all the acceptances for the program have been received. Expectations are that it will be ready to submit to the membership, at least in tentative form, by the end of this month.

Committee reports are being received from the chairmen, and the work of editing and printing is being followed up as rapidly as possible. There are, however, some reports that have not been received, and it is hoped at association headquarters that they will be in hand so as to insure distribution prior to the convention.

Annual Convention

and Exhibits

A. E. R. A.

Atlantic City, N. J.

October 6, 7, 8, 9, 10

Engineering Association Nominations

THE nominating committee of the Engineering Association, John Lindall, chairman, announces the following nominations for officers and members of the executive committee for the coming year:

President, C. H. Clark, engineer maintenance of way Cleveland Railway, Cleveland, Ohio.

First vice-president, R. C. Cram, engineer surface roadway Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

Second vice-president, Charles R. Harte, construction engineer The Connecticut Company, New Haven, Conn.

Third vice-president, Daniel Durie, general superintendent West Penn Railways, Connellsville, Pa.

Secretary and treasurer, James W. Welsh, executive secretary American Electric Railway Association, New York, N. Y.

Members of executive committee: R. H. Dalgleish, chief engineer Capital Traction Company, Washington, D. C.; E. H. Scofield, engineer power and equipment Twin City Rapid Transit Company, Minneapolis, Minn.; M. B. Rosevear, superintendent of distribution Public Service Railway, Newark, N. J.; Frank H. Miller, vice-president Louisville Railway, Louisville, Ky.

City and Interurban Operation

THE committee on editing appointed at the St. Louis joint meeting of the committee on city operation and the committee on interurban operation met Aug. 8 at association headquarters in New York. Those present were G. C. Hecker, J. S. Bleecker, G. W. Welsh and Morris Buck.

The contributions submitted by the regional vice-chairmen for the handbook were read and judged for publication with a view to selecting carefully for inclusion in it those descriptions of practices pointing the way to improvements that can be of value to other properties.

It was decided that the entire joint report of the two committees should be followed by the reports of the regional vice-chairmen, as this method will eliminate duplication and present the discussion in more logical form.

The reports of the regional vice-chairmen were read. It was found that each treated the subject matter from a different viewpoint. All but one of the regional vice-chairmen has presented a report for inclusion in the annual report of the committee. Work on the handbook is progressing in line with the recommendations made.

Special Reports Available

THE following special reports have been prepared by the Bureau of Information and Service of the American Electric Railway Association and are available to member companies in good standing upon request:

Electric Railways Operating Buses: A revision of the compilation of March 1, 1924, bringing up to date the data on number of routes and buses operated, type of bus and seating capacity, fare charged and transfer privileges of approximately 165 electric railways.

Trend of Electric Railway Operations: A month by month record of the traffic, revenues, expenses, taxes, car-miles, operating ratio, etc., of a group of 80 companies. Graphic curves showing the principal trends are presented to illustrate the figures, bringing the record of operations down through May, 1924.

Traffic Ratios — Part III. Combination City and Interurban Lines: There is shown for each of about 85 companies the average speed, revenue passengers per mile of track, per car-mile and per car operated, operating ratio, revenue per mile of track, passengers per car-mile, operating income per mile of track and other ratios.

Electric Railway Fares in Cities of More than 25,000 Population: A brief summary of fare systems and rates in each city, with a general summary reviewing changes which have occurred in recent years.

Relief from Paving Charges: Tabulated summary of 48 cases in which electric railways have been relieved either wholly or partially of the burden of maintaining the pavement between their tracks.

In addition to the above, supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies have been prepared, bringing them down to date.

The News of the Industry

$700,000 Spent for Track

Large Expenditure Made by Detroit Municipal Line Last Year for This Item Alone

More than $700,000 has been expended by the Department of Street Railways at Detroit during the last year for track construction, repair work, rehabilitation and extensions. A summary report by H. M. Gould, acting assistant general manager, discloses this fact. Major operations undertaken by the department during the year are divided in the report into five classes: New trackage constructed, special trackwork renewals, track reconstruction, major track repairs and work required in connection with the widening of twenty-one streets, the cost of which to June 30, 1924, was $53,000. The cost of completing this work is estimated at $111,650.

According to Mr. Gould's report, since May 15, 1922, when the city lines of the Detroit United Railway were purchased by the city, consistent and steady progress has been made toward rehabilitation of the property so acquired, new cars have been placed in service, in part replacing obsolete cars, trolley wire and overhead equipment renewed, power station equipment overhauled and repaired and track and pavement reconstructed. At the same time additional track mileage has been constructed and detail studies have been made to cover service for districts not now served with transportation.

SUMMARY OF WORK PRESENTED

New trackage cited includes four streets totaling 23,601 lineal feet of single track, part standard monolithic type construction and part open type construction.

Special trackwork renewals have been made in numerous locations where the life of the old special trackwork has been exhausted. The total of this special trackwork is 270 tons.

Track reconstruction was carried out on six streets where the former tracks were built in 1894, 1895 and 1909.

By major track repairs is meant the complete uncovering of the track to its very foundation; the tightening of the existing rails and ties on the foundation and the repair of the track joints by cutting in new pieces of rail where joints are broken down, and the placing of a new pavement.

Major track repairs are shown on fourteen streets. A summary follows:

Old track joints replaced	850
Lineal feet of straight rails resurfaced and relined	95,000
Square yards of pavement replaced	26,000
Cubic yards of concrete foundation replaced	1,000
Feet of rail corrugations ground	90,000

The report points out that numerous individuals and various associations have, from time to time, taken up with the Department of Street Railways the matter of extending service into districts not now served. In order to handle this very pertinent subject in an intelligent way the department has set up a traffic survey crew. The function of the members of this body is to make detailed studies of the sections involved, taking a house-to-house canvass to determine the exact number of potential car riders as part of the effort to procure what the Department of Street Railways considers a very necessary arrangement—transportation through co-operation. In a territory approximately 21 square miles in area the total cost of the survey was approximately $40 per square mile. These studies are designed to aid both the petitioner and the Department of Street Railways in determining the most economical and feasible type of transportation where it is shown that transportation is required. The sections now being studied embrace an area of approximately 41 square miles.

Fare Cut Denied to Cities

Commission Holds Connecticut Company's Rate Reasonable—Bridgeport Fare Advanced—Segregation Denied—In 1923 Company Earned About 4½ per Cent on Its Investment

THE token fares established by the Connecticut Company, that is, three for 25 cents, were recently declared reasonable by the Public Utilities Commission. Thus did the commission establish a uniform rate for all lines operating in Connecticut, as was referred to in the ELECTRIC RAILWAY JOURNAL of Aug. 2. This opinion was handed down in denying the petition of the cities of Hartford, New Haven, Waterbury, New Britain and Stamford, for reduction in fares. The rate in Bridgeport was ordered increased from 7½ cents, or two tokens for 15 cents, to 8⅓ cents or three tokens for 25 cents. In doing this the commission refused to make any segregation of the company's system.

The commission finds that the company in 1923 earned about 4½ per cent on its total investment. It said that if proper deduction for depreciation were made and a fair and reasonable estimate of present value ascertained, the rate of return now being earned would be considerably less.

The company received from all sources of revenue in 1923 about $14,780,000. After deducting wages, maintenance of property, state and municipal taxes and other general expenses, a balance of $2,530,000 was available for depreciation, return on property and reasonable surplus. The passenger revenues for the period Jan. 1 to Feb. 10, 1924, continued falling off at the rate of more than $1,000,000 a year. At the end of that period the 8⅓ cent token fare went into effect, except for the city of Bridgeport and adjoining communities. Revenue for the first three weeks subsequent to that fare increase after excluding Bridgeport showed an increase of 9 per cent when compared with the three weeks preceding Feb. 10, which were under the 7½-cent token fare. In addition, the company still owes the state of Connecticut nearly $802,000 in overdue and unpaid taxes.

The commission stated that the New York, New Haven & Hartford Railroad requested that it be allowed to intervene to the extent of asking that the Connecticut Company be accorded the right, if it could, to earn a fair return on the fair value of its property. For this purpose it made a statement covering the financial relations of the two companies since 1910, the year in which the Connecticut Company acquired its properties from the New Haven road. During this period the New Haven road has expended in interest on underlying bonds of the Connecticut Company about $10,000,000, and $2,500,000 for retirements and contributions to the sinking funds of these bonds. The New Haven has advanced the Connecticut Company in the same period the sum of $6,750,000, of which $500,000 has been repaid. The New Haven Company now holds $1,000,000 of overdue debentures, about $4,569,000 in demand notes, both issued by the Connecticut Company, as well as the beneficial ownership of the $40,000,000 of capital stock, or a total present investment of about $45,569,000.

In the matter of segregation the commission stated that the different cities asking segregation of the company's system offered no suggestions as to what territory outside of the city proper, each forming the nucleus of a division, should be included, and confined themselves to a claim that certain lines now included in the present divisional arrangement should be excluded. The commission said that since it appears conclusively that no division as at present constituted was earning a fair return on the fair value of the property in that division, it was obvious that there could be no advantage in regrouping of existing divisions resulting in an increase in the rates of some and probably in no case resulting in a decrease in rates for others. Further, it stated that the only advantage to be gained in a regrouping of the system into other operating and accounting divisions, would be the establishment of a rate of fare which might be lower for some divisions so created, although higher for others. Such rearrangement, no matter how carefully planned, would not eliminate certain fixed charges and inter-related expenses applicable to the company as a whole, and which would have to be allocated among the several divisions.

The commission said that in the absence of power to abandon non-paying lines, there might be a question as to the right to segregate the corporate property of the company into separate rate areas, as this would result in confiscation of that part of its property located in non-paying sections.

TOKEN FARES DECLARED REASONABLE

The commission said, therefore, that, based upon the foregoing, it was of the opinion that the token fares established by the company, to wit, three tokens for 25 cents, were not unreasonable; that the token fares in Bridgeport and adjoining communities should be increased from 7½ cents or two tokens for 15 cents, to 8⅓ cents or three tokens for 25 cents, and that the commission was not justified at this time and in these proceedings to make any arbitrary segregation of the company's railway system or to change the existing divisional lines. It was therefore ordered that the petitions of the cities of Hartford, New Haven, Waterbury, New Britain, and Stamford be denied. It was further ordered that the petition of the Connecticut Company for an increase in the token rates in Bridgeport and adjoining communities be granted, and the company was authorized and directed to establish and put into effect on and after Aug. 3, 1924, a token fare of 8⅓ cents or three tokens for 25 cents on the Bridgeport lines where the 7½-cent token fare was in effect.

New Power Rates Beneficial to Toledo Company

The City Council at Toledo has approved a rate settlement between the Community Traction Company and the Toledo Edison Company which will not jeopardize the interests of either company in present court and utilities commission actions, but will benefit the railway by assuring it a material saving in power costs. The new rate is retroactive to April 1 and approximates 1.3 cents a kilowatt-hour, showing a saving of about 3 mills per kilowatt-hour over the old rate. This amounts to a flat saving of more than $7,000 a month.

As compared with a similar period last year the company payrolls are showing a saving of approximately $30,000 monthly. In June this saving was $31,752.

Indianapolis Considers Bus

The use of buses to supplement city railway service is being considered by officials of the Indianapolis Street Railway, according to Robert I. Todd, president of the company. He said that definite action would be taken by the board of directors of the company after extensive surveys are completed concerning the advisability of their installation. If the buses are put in operation, they would be used to transfer passengers between lines at certain designated points and as extensions to car lines in rapidly growing sections of the city. The question of the company operating buses was brought up when officials of the company appeared before the City Council with a request for a fare increase. At that time members of the Council asked for information on the bus system and the company explained that because of its financial condition it would be impossible even to consider the matter. However, the company officials have decided to institute a survey, the result of which will decide the question of bus installation.

Port Huron's Anti-Safety Flurry Is Ended

Street cars were restored to service in Port Huron, Mich., on Aug. 9, and all but the bus men were happy. Service over the electric railway was shut down on Aug. 4 when the City Electric Railway (Detroit United Lines) started the operation of one-man cars. Hugh E. Stringer, chief of police, parked his car across the rails, as evidence that he was with Mayor McIlwain and the City Commission in their opposition to one-man car service.

As the company clearly could not afford to continue running twenty-four seat cars with two men each and at a 5-cent fare, it looked as though a long drawn out lesson in transportation economics was in store for the 35,000 inhabitants of Port Huron and their thousands of summer visitors. Happily this did not prove to be the case. The public had already secured most of its education vicariously through the troubles of Neighbor Saginaw. It had no desire to go through the same mutual recriminations and losses. An ordinance passed by the City Council required that service be restored by Aug. 7 under penalty of the loss of the franchise.

Pending a settlement of the dispute with the railway the city granted operating permits to a collection of motor substitutes ranging from the finest interurban multidoor de luxe coach to the shabbiest touring wreck. But every blessed one of them charged 10 cents and only one operator who owned several coaches did anything to make free transfers effective and his was a feeble effort. The realization that they were in for double and quadruple fares on vehicles operated by one man brought the public and its official sentinels to a rapid recognition of their inconsistency in opposing one-man direction of the cheaper, more commodious and tax-paying trolley.

That's why the City Commission accepted on Aug. 7 the suggestion put forth by Elliott G. Stevenson, president of the railway. He proposed that:

> 1. Service be restored on the basis of 50 per cent one-man cars and 50 per cent two-man cars, so that patrons can become acquainted with each.
>
> 2. The people be permitted at the election of Sept. 9 to decide this question: Do you prefer one-man car operation at 5 cents or two-man car operation at 7 cents?

The suggestion thus advanced was accepted.

First De Luxe Bus Run by Detroit Municipal

Ross Schram, general manager and other officials of the Department of Street Railways at Detroit, made a trial run of a Fageol fifty-eight-seat double-deck bus through the Grosse Point district and other places on Aug. 8 as the first step toward the expansion of the city's activity in this field. As announced in the Aug. 9 issue, the Department of Street Railways is planning to go into the bus field in a larger way than its present operation of a few supplementary buses and the Belle Isle Service.

The six-cylinder bus, borrowed for the occasion, is of the low-hung pneumatic-tired type with the wheel and axle housings placed so that there is no interference with the seats. The twenty-six seats on the lower deck are of the transverse type, upholstered in soft leather and of ample width for two wide-gage riders. The upper deck, seating thirty-two, comprises a longitudinal back to back bench made of heavy wicker weave and formed to permit comfortable, non-sliding riding. The bright color of the bus and its decoration with the city's seal (now decalcomaniad on all cars as they go through the paint shops) attracted much attention. During the run, the bus was stopped at one of the carhouses where it was subjected to valuable comment by conductors and motormen.

The following statement was issued by the Street Railway Commission:

> The sincerity of the Street Railway Commission in the matter of the plan for bus operation having been questioned by one of the papers, we wish to state that there can be no doubt as to our sincerity in the matter. The question has been studied by the commission for many months with the special assistance of William B. Mayo. It has been discussed with Mr. Martin, as Acting Mayor, and the general policy has been agreed upon by the officials concerned, merely awaiting final detail recommendation from the operating staff.
>
> The question of ordering or non-ordering of a definite supply of buses is not at this time important, as orders can not be given until we have a definite recommendation from the operating department upon which to act and with which to go before the Council for proper authorization.
>
> In so far as the ability of the commission to obtain buses is concerned, we wish to state that we have definite assurance of the delivery of from 75 to 100 chassis within ninety days, of course, subject to our approval of that design of vehicle.

Mr. Mayo, chief engineer of the Ford Motor Company, was formerly general manager of the D. S. R., and is still associated with the department in a consultant capacity.

Paving Being Done by Court Direction

Paving is under way between tracks in the village of Grandville, Mich., by the Michigan Railroad, now operating under Stewart Hanley, Detroit, receiver. The paving will be of brick and will be around a single track instead of a double one over which the company's cars hitherto passed. The strip to be paved is a mile long. It will cost about $57,000 to carry out the work. The construction follows a dispute of some years standing. After many months in court the railroad was ordered by the Supreme Court of Michigan to pave, but this was not done, company officials saying material was not then available. Recently residents took matters in their own hands and blockaded the tracks. Their action led to the hastening of the appointment of a receiver by Judge Clarence Sessions in United States District Court on petition of certain Chicago interests. The federal court ordered that as part of his duties as receiver, Mr. Hanley see that the work of paving was done.

St. Louis Bus Company Changes Original Petition

The St. Louis Bus Company applied on Aug. 6 to the board of Public Service of St. Louis for permits to open four routes from outlying sections of the city to the downtown district. This was a decided departure from the originally announced policy of the new organization, to furnish supplemental service to the cars of the United Railways with transfers from bus to street car and vice versa.

Two of the routes sought are virtually the same as those for which the People's Motorbus Company now has applications on file. The others conflict with plans of the rival bus company also. The formation of the new bus company followed the failure of the reorganization committee of the United Railways to come to terms for the purchase of the People's Motorbus Company and the rejection by the latter organization of the plan of Col. Albert T. Perkins, general manager for the United Railways, to furnish supplemental service to street cars with an interchange of transfers.

Mayor Henry W. Kiel of St. Louis conferred with the organizers of the St. Louis Bus Company on Aug. 5 and he expressed the belief that supplemental bus service as originally planned by the new company was not sufficient, contending that the people wanted through service on buses. The change in the plans of the St. Louis Bus Company resulted from the conference with Mayor Kiel. The Mayor has just returned from a trip to London where he attended the convention of the Advertising Clubs of the World. He is said to have informed interviewers that he considers surface street cars obsolete and regards motor buses and subways as the modern method of handling metropolitan transportation.

The new company plans to permit a transfer system with the United Railways and all money earned above a fair return on its invested capital will be given to the United Railways. Later when the United Railways reorganization is completed the bus lines will become part of the railway system. A contract is being drawn up to permit a fair adjustment on transfers between the buses and street car, subject to the approval of the United States District Court and the Missouri Public Service Commission.

The Board of Public Service at its meeting on Aug. 6 considered the applications of both the St. Louis Bus Company and the People's Motorbus Company for the new permits but took no final action.

Portland Electric Power Seeks Crosstown Bus Franchise

Formal petition for municipal franchises for the operation of "cross-town" buses at railway fares, and with car transfer privileges, has been filed with the City Commissioners in the form of a proposed ordinance, by the Portland Electric Power Company, Portland, Ore.

The franchise requested in the petition provides primarily for the operation of buses as an extension of the railway service. It also provides for the optional operation of buses in either or both directions on a number of additional streets in the city.

Duration of the franchise has been fixed at six months, Mr. Fuller explaining that the contemplated service is merely an experiment. Provision is made that if unusual storms or snowfall tie up the service, the franchise shall not be revoked if effort be made in good faith to continue such service.

The proposed ordinance stipulates that bus fares shall be the same as those charged on carlines operated by the company, and that passengers shall be entitled to the same ticket rates, transfers and other privileges as are granted railway patrons.

The company will provide for property damage insurance in the sum of $1,000 and liability insurance covering personal injury in an amount not less than $10,000 for one person in any one accident, and not less than $20,000 for all persons receiving personal injuries by reason of any one accident.

Continuation of the service and the operation of extensions thereto, will depend upon the financial returns of the experiment.

Bus Terminal Interest Acquired by Twin City Company

As the result of its purchase of the Twin City Motor Bus Company, announced in the issue of ELECTRIC RAILWAY JOURNAL for Aug. 9, the Twin City Rapid Transit Company, Minneapolis, has acquired the bus company's interests in the Union Bus Terminals in both St. Paul and Minneapolis.

The Minneapolis Depot is owned equally by six bus companies, and the St. Paul terminal by seven. The Twin City Motor Bus Company held an equal share with the other companies in each terminal, and under the terms of the purchase the railway acquires this interest as well as the other physical property of the bus line.

Contracts between the members of each depot company give the company the option to purchase the interest of any stockholder who desires to sell. Each participating stockholder cannot own more than a fraction of the total stock equivalent to the number of members in the terminal at any time.

Both the railway and the bus lines have expressed a willingness to continue under the original arrangement, so that the buses acquired by the railway in the purchase of the Twin City Motor Bus Company will continue to use the terminals as heretofore. The railway has become a participating member in the management of the two terminals. H. L. Bollum, general manager of the railway's bus interests, is a member of the board of directors of both the Minneapolis and the St. Paul Depots.

Orders Three-Cent Charge for Transfers

Replying to the demand of the city of of Tacoma, Wash., that it receive 3 cents for each transfer of the Tacoma Railway & Power Company taken up by the municipal car line, the company has made a counter proposal that the city and company take up each other's transfers without collecting anything for them. The proposal was submitted to the Council by E. J. Rounds, superintendent of the traction company, and referred to Mayor A. V. Fawcett, who has charge of the municipal line. The Mayor and the Council upon consideration, refused the company's offer, and notified the company that its transfers would not be honored on the municipal line unless the company agreed to pay 3 cents for each transfer collected by the city. Mayor Fawcett presented to the Council figures showing that the city would lose about $250 a month by adopting the system proposed by the company.

Ten-Cent Fare Sought in Johnstown

The Johnstown Traction Company, Johnstown, Pa., has filed with the Public Service Commission a new schedule of rates to become effective Sept. 5. The tariff provides for an increase to 10 cents, or four tickets for 30 cents. The present fare is 7 cents or four tickets for 28 cents. Special tickets to school children will remain at 5 cents.

The increase is made necessary, according to Manager Shannon, by the increasing demands for public improvements, street paving, relocations of tracks and in maintaining the present high standard of service. The increase in the use of the automobile has resulted in a decrease in railway receipts. In May, 1924, receipts were $99,761 as compared with $108,502 in May, 1923, in June receipts were $90,676 compared with $105,233 in June, 1923. July receipts for the first twenty-four days amounted to $68,351 compared with $82,624 in July, 1923.

Buffalo Bus Hearing Set for September

At the conclusion of the hearing before the City Council of Buffalo on the application of the International Railway and the VanDyke Motor Bus Corporation to operate a fleet of double-deck buses in Buffalo on a 10-cent fare, Mayor Frank X. Schwab said he would proclaim a transportation emergency existed on certain avenues and streets in the city and permit the operation of buses without the consent of the City Council or Public Service Commission.

Neither the International Railway nor the VanDyke Motor Bus Corporation would indicate whether it would take advantage of the proposed emergency order of the Mayor in view of the fact that a similar order was issued during the last street car strike and the higher courts of the state ruled buses were being operated illegally and ordered the Mayor to revoke the emergency permit.

It was evident that the City Council sought to sidestep definite action on the applications of the two companies for consent to operate buses in Buffalo so that the matter could be taken up with the Public Service Commission of the state. The Council said it would reconsider the applications early in September after the summer adjournment of the Council.

Mayor Expected to Report Soon on Chicago Purchase Terms

A special meeting of the City Council will be called during the summer recess to consider Chicago's traction problem. Several days ago Mayor Dever revealed that this was his plan. Whether he will submit a definite suggestion looking toward the municipalization of the traction lines of the city at that time or will report failure in the negotiations, the Mayor would not say.

The conferences called by the Mayor with officials of the Chicago Surface Lines and the Rapid Transit Company are nearing an end. The Mayor is awaiting definite figures from Samuel Insull, chairman of the board of directors of the elevated, touching certain phases of the valuation. These figures will be among the matters presented to the City Council, according to present plans.

Within several weeks at the latest, it is expected, the City Council will have before it the verdict of the Mayor and his traction advisers respecting the wisdom of the plan to purchase the existing lines at the price set upon them by the representatives of the various companies.

More Moves Made in Minneapolis

Significant events continue to follow each other rapidly in the history of the Minneapolis Street Railway, Minneapolis, Minn. The latest development is an attempt by the socialist-labor aldermen in the City Council to force the hand of the Minnesota Railroad & Warehouse Commission to reduce fares to 5 cents from 6 cents, with free transfers. Another move is the introduction by Alderman A. R. Gisslen of an ordinance to permit operation of jitneys in competition with the street cars. He said:

> In case the Railroad & Warehouse Commission does not find in favor of the city for a 5-cent cash fare with six rides for a quarter, we will run the railway out of the city.

The commission has practically finished the work of taking testimony in the Minneapolis Street Railway valuation case and a decision is expected before the end of the year as to a permanent rate of fare.

The jitney ordinance would be effective Oct. 1. It is proposed that the Council shall fix rates of fare and routes; that all jitneys must get city license, in the application giving names of drivers, provide a minimum bond of $10,000 liability for each bus with insurance of at least $5,000 for any person injured or killed; that each bus must pay annually $25 for each 7-passenger capacity, plus $2 for each additional seat; and loading must not be more than 50 per cent above seating capacity.

Jitneys were formerly operated, but they were withdrawn under the terms of a gentlemen's agreement that the Council would issue no jitney licenses.

O. J. Turner, chairman of the street railway committee of the Council, opposes the view favorable to the jitneys. He said the jitneys would take the short haul or cream trade and thus deprive the railway of the main source of passenger revenue. This would result in either decreased service or higher fares. He said:

> Under the state control act the fare is based on cost of service and the City Council should co-operate with the company in reducing service costs to the minimum.

Free bus service is offered to Glen Lake Sanatorium by the Twin City Rapid Transit Company. Buses are operated between Minneapolis and the sanatorium and the Yellow Cab Company competes with taxicabs marked "Fare same as bus fare to Glen Lake." Now the suburban trolley offers free bus service from Glen Lake station to the sanatorium. Commutation and regular tickets from Minneapolis include bus transportation at the regular cash fare of 24 cents or commutation fare of 20 cents.

Railway Extensions Proposed in Oakland

The Key System Transit Company, serving the East Bay cities in California, in addition to two bus lines in Alameda and three in Oakland, is planning two electric line extensions as a result of the traffic survey now in progress.

The first of these will give Piedmont easier access to San Francisco. In all, this will include about a half mile of new trackage along an old right-of-way never before used by the company and partly along tracks used by another line. Work has already been started on this line.

Piedmont, a city that adjoins Oakland, has applied to the State Railroad Commission for a transfer privilege from the cars of the traction company serving that city to Key System trains running to the San Francisco ferry. The new extension is a compromise on this matter.

The second electric line extension planned is one in Oakland. This will include about 1,000 ft. of trackage up Trestle Glen, serving the Glenview district, residents of which also are seeking more direct means to reach San Francisco than are at present afforded. Trains of the Key System Transit now run part way up the Glen, a district recently developed by a realty concern.

Strike Because of One-Man Cars.—The motormen and conductors of the Slate Belt Transit Company, Pen Argyl, Pa., which operates between Bangor and Nazareth, went on strike on Aug. 1 when they were asked to operate one-man cars between Wind Gap and Nazareth.

Authorities Differ Over Brooklyn Wreck Findings

Two official reports have been made in regard to the wreck on Aug. 5 at the Ocean Parkway elevated station of the Brooklyn-Manhattan Transit Corporation. One is by the New York State Transit Commission and the other by the Board of Transportation of the City of New York. The conclusion reached in both cases is that the brakes were applied too late to prevent the collision. No defects were found in the air brake equipment which might have prevented the proper application of the brakes.

The reports of the two commissions differ principally in the opinions that are expressed in regard to the question of the use of wooden cars versus steel cars for elevated service. The leader train, which was stationary at the platform at the time of the accident, was made up of steel cars while the so-called follower, which rammed the train ahead, was composed of wooden cars.

The report of the Transit Commission states that the operating motor car of the wooden-car train telescoped the rear car of the steel-car train for a distance of 13 ft. In doing so the under frame of the wooden motor car was forced under the rear of the steel car and the forward truck of the wooden car was pushed back so that the brake cylinder head of wooden car was broken. The entire side body frame on each side of the wooden car was demolished and the motorman's operating cab was forced back 6 ft.

The second car of the train made up of wooden cars was in turn telescoped by the front car for 10 ft. The drawbars between the cars were broken and the platform and forward bulkhead of the second car were demolished. The rear platform of the third car of the wooden-car train buckled and the buffer timbers broke. The remaining three cars were only slightly damaged.

The rear truck of the last car of the steel train was pushed forward and the drawhead was broken off. Other than this, the cars which made up the steel train showed no signs of damage.

The discussion as to whether there would have been less damage had both trains been composed of steel cars appears to hinge about the contention that due to the qualities of greater resistance to shock inherent in steel cars there is more danger of cars of this type being derailed and thrown from the elevated structure in case of collision than there would be in the case of wooden cars. The contention has also been advanced that in case of collision between steel cars on an elevated structure the cars would be likely to buckle while with wooden cars their superstructure would be demolished, but the cars would continue in the general direction in which they were headed without danger of derailment or of being thrown from the structure.

The Transit Commission takes the stand that the wooden cars were safe and adequate for elevated operation. The Board of Transportation maintains that the equipment was old and obsolete and consequently unfit for service.

Both Mayor Hylan and G. M. Dahl, chairman of the railway, have commented on the findings.

Brooklyn Company Asks Bus Rights—Zone Fares Suggested

Application was made on Aug. 14 by the Brooklyn-Manhattan Transit Corporation to the Mayor and to the Board of Estimate and Apportionment of the city of New York for franchises or other legal permits for routes for the operation of buses. Without undertaking, at the present time, to specify all of the routes upon which bus operation is desirable, application is made for authority to place buses in operation over routes in the Kings Highway, Brownsville and Richmond Hill sections.

Under the law, the Transit Commission will have jurisdiction of such corporation in respect to a certificate of necessity as to such matters as capitalization, accounts, character and safety of equipment and operation. The company explains, however, that in order that the city and the public may be further protected, it is willing to agree that the city shall have access to the books and accounting of the bus company and absolute veto power on all capital expenditures as well as the veto power on the issuance of securities or stock by the bus company and the price at which such securities and stock shall be sold.

It is suggested that the rate of fare be one which will pay operating expenses, taxes, provide for necessary reserves and give a fair return on the capital actually invested. During an experimental period, to be agreed upon, the rate of fare upon the routes suggested would be 5 cents.

Chairman Dohl for the company says he is willing to discuss with the city authorities the public advantage of a 5-cent fare for short hauls and a higher fare for longer hauls and the establishment of a scientific zoning system as well as the possibility of ultimately providing reduced fare transfers between bus surface and rapid transit facilities.

Safety Measures Considered in Chicago

There will be no more arrests of Chicago motorists who drive their cars across Chicago street car tracks at a speed greater than 10 m.p.h. The corporation counsel has so ruled. The city ordinance under which the arrests had been made was passed some years ago. It was intended to safeguard both the driver and the occupants of other vehicles from possible injury. The corporation counsel, his attention called to a recent ruling of the State Supreme Court that the right to prescribe speed regulation lies in the state authorities, agreed that the ordinance could not be legally enforced.

For the first time in its history Chicago will try safety loading zones. It was intended to start with them some time during the week ended Aug. 16. Both motor clubs of the city, called into conference with Leo J. Winiecki, director of the public service department, agreed that the city's traffic problem might be helped with the installation of loading zones. Zones 6 ft. wide and 55 ft. long will be painted on the pavement alongside the tracks. Parking will be prohibited 25 ft. back of the end of the zone which will be marked by removable standards. It is planned to operate the zones from 7 a.m. until 6.30 p.m. Two zones on Clark Street at Madison and Monroe Streets will be the first ones instituted.

"Go Slow!" Warns Court

Kansas City Jurist Gives Car Riders Some Facts to Ponder—Open Minded on Bus

Judge Kimbrough Stone, in charge of the receivership of the Kansas City Railways, has urged against premature action by the city on the subject of bus operation and has stated that "the court is entirely open minded" on the subject of operation of bus lines by the railway, "but has not the information and has not given the subject sufficient serious thought to reach any conclusion." The subject, however, was held to require careful study and consideration, both from the standpoint of the utility of the bus as an additional transportation agency in Kansas City, and from the position of the creditors of the railway, whose funds would be used if a new bus service under railway direction were instituted.

The court held that operation of an independent bus system in competition with the railway might work so serious an injury to the existing transportation agency that it would permanently cripple railway service in the city.

These ideas by the court were expressed in a letter addressed to the receivers of the railway. Except for the salutation, the letter follows substantially in full:

> As to bus operation by other than the railway the court has definite ideas derived from observing the actual effects of a similar form of competition from jitneys. As to operation by the receivers the court is open minded but has not the information and has not given the subject sufficient serious thought to reach any conclusion.
>
> Experience with jitneys in Kansas City has proved that regular operation of well equipped bus lines would result in dangerous loss of patronage and revenue to present street car service—a service made possible only because the wisdom of the city officials has done away with jitneys.
>
> The undoubted greater loss from regular bus lines probably would necessitate abandonment of many lines, unprofitable even now; might, if sufficiently threatening, force the court, to order stoppage of all service.
>
> Some manufacturers of buses get an operating franchise or permit from a city; go into operation; harm the railway and then sell to the railway at a handsome "water" profit.
>
> Right now in St. Louis a company controlled by the same bus manufacturing corporation whose representatives are clamoring to operate in Kansas City is, I am informed, demanding a profit of $1,000,000 or about 80 per cent above actual investment on the bus lines there. This court never will permit the car riders of Kansas City to be victimized through the purchase of a competing bus line.
>
> Whether railways should operate bus lines is a new and difficult problem. The question becomes particularly grave when the answer must be made by this court concerning property of others. Such a step involves:
>
> 1. A venture into new fields which have not (so far as this court knows) been thoroughly proved under conditions present in Kansas City (such as topography, density of population, character of paving, traffic congestion, traffic control, etc.)
> 2. A de luxe service not possible regularly to most street car riders because of the higher fare, or possibly, because of lack of transfer rights. However, it is clear that a combination of the two grades of service may react unfavorably upon the cheaper service, through removal of the richer class of the present street car patrons to buses or in other way.
> 3. The expenditure of a vast sum of money painstakingly accumulated to pay debts long due from an insolvent property to hundreds of creditors, many of whom are sorely in need of their money.
>
> No self respecting court would determine matters so seriously affecting the property and rights of others and of the public without full information and careful consideration. That information will be collected without undue delay or unseemly haste.

On the presumption that the receivers would desire to make the letter public, the court said:

> This court has had four years of intimate association with the railway problem and believes the welfare of the system and the well being of this community are inseparable. The court will do its best to preserve both. It can not, however, say what forms of transportation Kansas City shall select and have. That is the problem of the people of Kansas City and their chosen officials. Upon them must rest the burden of the responsibility of determining whether two competitive transportation systems can survive in Kansas City.
>
> To the correct solution of this problem the court bespeaks the careful, earnest thought and action of every serious minded Kansas Cityan. Unless you are convinced that the street car is no longer necessary, is it not wise to be cautious lest you cripple the only transportation system you have so that it will be unable to serve you except haltingly if at all? It is a matter for genuinely serious pause and thought.

Union Terminal in Los Angeles Will Be Decided by I. C. C.

The long-drawn out battle waged by the city of Los Angeles to force the railroads entering Los Angeles to establish a union depot at the Plaza has practically been closed with the city of Los Angeles on Aug. 5, filing its briefs for a decision by the Interstate Commerce Commission at Washington. The city requests the commission, in its order, to have the Southern Pacific abandon its main-line tracks on Alameda Street for the operation of passenger and freight trains, while a request was made that the Sante Fe line, the Union Pacific system, and the Pacific Electric system abandon certain grade crossings. At the same time, the Southern Pacific, Union Pacific and Pacific Electric joined their cases in one brief and argued for the establishment of a union station at the present arcade depot of the Southern Pacific while the Santa Fe objected to unification.

During the latter part of June the California State Railroad Commission and the city of Los Angeles presented their definite plans for the Plaza union passenger station for the trains of all the roads. The new plan of the commission proposes not to shut off any street nor would it eliminate the plaza from its historic position.

When this matter developed it was based upon the action of the California State Railroad Commission ordering the four rail lines to unify their lines in a joint terminal. The railroads fought the order of the commission and carried the case into the United States Supreme Court. That body ruled that the commission was without jurisdiction in making its order. The city of Los Angeles then carried its fight before the Interstate Commerce Commission.

In its application to the federal rail regulating body, the city asked that the original Plaza plan be ordered executed.

News Notes

New Tariff Filed. — The territory served by the Port Jervis Traction Company, Port Jervis, N. Y., in accordance with a new tariff filed with the Public Service Commission, has been divided into two zones, each with a 5-cent cash fare. This represents a reduction of 3 cents from the former rate. Between any point in Zone 1 and any point in Zone 2 the 8-cent cash fare will remain. Books containing ten tickets will be sold for 75 cents. Such tickets will be accepted for passage between any two points on the company's lines where the cash fare is 8 cents (reduction 5 cents). These tickets will also be good for certain joint transportation in connection with the Port Jervis Transit Company, Inc., a new bus company.

Thomas E. Mitten Safe.—Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, Philadelphia, Pa., was not in the automobile accident in the Canadian Rockies in which his brother William E. Mitten was killed. Reports at first had it that the Philadelphia traction official had been killed along with his brother, but Thomas E. Mitten had left the party and was in Seattle at the time of the accident.

Joint Rates Continued. — Continuation of joint freight rates between the Bamberger Electric Railroad, Salt Lake City, and the Denver & Rio Grande Western Railroad has been ordered by the Public Utilities Commission of Utah. The Denver & Rio Grande Western fifteen months ago filed tariffs to cancel joint rates and increase rates on all classes and commodities of freight originating west of the Colorado-Utah line, which was to be shipped over both roads. The Bamberger Electric, which serves the centers of population, opposed discontinuance of the joint rates and acceptance of increased schedules. The commission takes the position that the proper development of the country, and the best interests of the shippers make necessary this continuance of railroad rates.

"Pass" Under Consideration. — The Ottawa Electric Railway, Ottawa, Can., is studying the "weekly pass" plan. The management in a recent issue of *O. E. R. News* stated that it was anxious to try any plan that would make for good service and a satisfied patronage.

Wages Advanced Ten per Cent.—A decision in the case of the employees of the Trenton & Mercer County Traction Corporation, Trenton, N. J., increases the men's wages approximately 10 per cent. The agreement followed a conference attended by James H. Vahey, Boston, Mass., representing the Union; Albert Richey, Worcester Polytechnic Institute, for the company, and Lewis C. Parker, chosen by the other two. The men asked for a 35 per cent boost. The new awards are as follows: An increase of 5 cents an hour retroactive to April 1; a payment of 10 cents to each employee who makes out an accident report; a credit of ten minutes' time to men for making out their daily reports; permission for the company to operate twenty swing runs and to pay not less than nine hours to be worked within fourteen hours. All early and late straight run work over nine and one-half hours to be overtime at time and one-quarter payment.

Plans to Extend D. T. & I. Railroad. —Henry Ford was authorized on Aug. 1 by the Interstate Commerce Commission to construct approximately fifty-six miles of new line for his Detroit, Toledo & Ironton Railroad at a cost of about $7,500,000. The commission also authorized the issuance of first mortgage bonds to raise the funds. The authorization was to the Detroit & Ironton Railroad, a subsidiary corporation, which Mr. Ford organized to build from Malinta, Ohio, to Durban, Mich. The new line will shorten haulage distances over the Detroit, Toledo & Ironton. Mr. Ford's plans looking toward the electrification of the Detroit, Toledo & Ironton have been referred to previously.

Wage Scale Renewed.—Trainmen of the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, on Aug. 6 signed a contract renewing the present scale and working conditions for another year. The men had previously sought an increase. The wages paid for another year will be 48, 50 and 52 cents an hour.

Hearing Concluded.—A hearing was held recently before the California Railroad Commission on the petition of the city of San Bernardino for a uniform 6-cent fare by the Pacific Electric Railway within the city limits. It is expected that a decision will be made within a month. The city as was referred to previously in the ELECTRIC RAILWAY JOURNAL is seeking to have the present 6-cent fare boundary limit extended from Mill Street to Esperanza. A 9-cent fare is now required on cars south of Mill Street. This is the rate between San Bernardino and Colton.

Tokens in Use on Long Island Line.—The New York & Queens County Railway, New York, N. Y., has begun the sale of tokens for 6 cents. This is the same rate as the cash fare, and the tokens are placed on sale as a convenience to passengers. This railway is the only road in New York City selling tokens.

New Rates Sanctioned.—The Public Service Commission has authorized the International Railway to issue a commutation coupon book good for 25 rides any time during a calendar month between Buffalo and Park Avenue, Tonawanda, at the rate of $2.50 per book. The new fares will be effective Sept. 1.

Buses Will Replace Cars. — The Citizens Traction Company, Oil City, Pa., will suspend railway service between Franklin and Rocky Grove. Bus service will be substituted.

Men Receive Back Pay.—The Worcester Consolidated Street Railway, Worcester, Mass., has just completed distribution of $150,000 in back pay among its employees. This money was due the men from Jan. 1 to the date of the decision of the board of arbitration which granted an increase of 10 cents an hour.

Recommend Service at Cost.—A committee of the Chamber of Commerce that has been studying the problem of making it possible for the electric railway in Tulsa to continue in operation has recommended a trial of the service-at-cost plan. The officials of the local railways state that they will be glad to have the experiment tried on their properties.

Will Operate Two-Man Cars.—Officials of the Springfield Street Railway, Springfield, Mass., have announced that they will comply with the request of the public and operate two-man cars from 5 a.m. to 8:30 a.m., and from 4 p.m. to 7:30 p.m.

"Weekly Pass" May Be Installed.—The San Antonio Public Service Company, San Antonio, Tex., is considering the advisability of the "weekly pass" plan for application on its system. The management believes this arrangement will increase the revenue. San Antonio now has a 6-cent fare with universal transfers.

Will Not Intervene in One-Man Car Protest. — The East St. Louis City Council has decided not to interfere with the plans of the East St. Louis Railway to install one-man cars on the Main Street and Cleveland Avenue divisions. This decision was reached following a conference with Mayor M. M. Stephens, city commissioners and W. H. Sawyer, president of the company. Mayor Stephens called the meeting after he had received a number of petitions protesting against the one-man cars. The City Council decided that it had no power to prevent the company from using one-man cars.

Unnecessary Service Ruled Out.—The Corporation Commission of Oklahoma has refused to permit J. A. McIntyre of Norman to establish a bus line for passenger service between Oklahoma City and Lexington via Moore, Norman and Noble. The commission holds that with the hourly service afforded by the Oklahoma Railway between Oklahoma City and Norman there is no necessity for the motor service and that public convenience would not be served thereby. The applicant was allowed to establish a bus line between Norman and Lexington via Noble.

Difficulties Settled. — Difficulties between the Michigan Electric Railway, Lansing, Mich., and its employees have been temporarily settled. The company has agreed with local Trades and Labor Council to reinstate after thirty days' suspension two bus drivers and 12 street car operators who were dismissed on charges of violating the rules.

Hearings for Buses in Framingham Settled.—Public hearings on the petitions of the Boston & Worcester Street Railway for permission to substitute buses in Framingham, Mass, on its Framingham Center and Saxonville branches will be held before the selectmen on Aug. 19, at the Framingham town rooms and before the state department on Aug. 22 in the State House. More trolley lines are said to enter Framingham than any other community in the state, outside of the larger cities.

Foreign News

Japanese Railway to Electrify

The electrification of the Tokaido Railway line between Tokio and Akashi has been approved by the directors of the divisions making up the entire railway system of Japan.

The work under consideration at present consists of the portion of the Tokaido line extending from Numazu to Akashi, a distance of approximately 300 miles. This work, not including the cost of locomotives, is estimated to require the expenditure of about 21,983,000 yen (approximately $10,700,000), made up of the following items:

	Yen
Substations	6,833,000
Overhead construction	13,203,000
Communication equipment	846,000
Train sheds	1,101,000
Total	21,983,000

It has been definitely decided to operate at 1,500 volts direct current, with single catenary overhead construction, fed from approximately twenty-five substations. It is estimated that approximately 80,000 kw. will be required to operate the system, which power will be purchased from private companies for the time being, though ultimately the government railways will construct a hydro-electric plant on the Tenryu River having a capacity of 65,000 kw.

Active construction work will begin early in 1925. The first section should be completed by the end of 1926, and the electrification of the entire Tokaido line is scheduled for completion by the end of 1928.

In addition to the electrification of the Tokaido line, the Railway Department has already prepared tentative plans for electrifying both the Central and the Northern lines.

While the foreign electric locomotives have so far dominated the field, at least one Japanese company is active in competing for this business. A trial locomotive recently completed and tested by the Hidachi Engineering Works in design embodies many features introduced by American manufacturers.

Traffic Project Proposed at Milan

Traffic congestion in Milan has become so serious that a committee was recently appointed to study the problem. A plan has been proposed, and approved by the Prime Minister, to decentralize the trams which terminate in Piazza del Duomo, a magnificent square with eight narrow streets leading into it. Under the new plan the trams would terminate at the Naviglio, a canal encircling the city about a mile out, and electric cars of the American light car type would carry passengers from the canal through the square to a destination on the further side of town. The type of car contemplated for inter-city service is a one-man storage-battery auto bus having a carrying capacity of forty to fifty passengers. This would mean economical operation and permit the cars to keep to the left, thus allowing two streams of traffic. It is expected that 150 new trams will be put into service soon to replace old running stock and also increase efficiency of service.

Extension of Paris Subway Is Planned

A project for the extension of the Paris Metropolitan Underground Railway to the suburbs at the east and south of the French capital is under consideration by the Paris Municipal Council. The first line it is proposed to extend will be that from the Bastille to Vincennes and that from the Luxembourg Gardens to Sceaux, making use of the present steam-operated surface railway line. The inner belt line railway, which joins the principal railroad stations in the capital, will for the time being be left out of the plan. The first problem to be decided is that of financing. Two committees working together, representing the Paris municipality and the government Ministry of Public Works, will formulate plans, through which the project may best be carried out.

Substantial Amount Invested in Barcelona Property

At a meeting of the holders of the 6 per cent first mortgage bonds of the Barcelona Traction, Light & Power Company, Barcelona, Spain, held recently in London, E. R. Peacock, speaking as president of the company, reviewed briefly the history of some of the important events in the development of the companies there. He said that since 1915 a substantial amount had been invested in the business of the operating companies, mainly from sale of securities of these companies.

In addition more than £2,500,000 had been put into the business out of earnings. It had been the policy of the company to keep the equipment in a high state of efficiency as part of the operating expenses but that any great operating company must year by year put back into the business a substantial portion of its earnings if it is to continue to grow and prosper. And further that it must confine its increases of capital to those required for the large developments which are called for only at long intervals. At the meeting resolutions were passed approving the proposal for the readjustment of the finances of the property. When the reorganization is completed the company, in the opinion of Mr. Peacock, will be in a sound position.

As originally contemplated the plan provided for the issuance of £2,000,000 of new consolidated 6½ per cent bonds to purchase and cancel £260,000 of prior lien bonds and for the redemption of the outstanding balance of £1,100,000 of 8 per cent debentures at 106.

One-Man Cars Operated in London Suburbs

The experiments carried out by the London United Tramways with a single-deck one-man car have been so encouraging that the company is now constructing others of the same type which will incorporate further improvements. The driver will be provided with a seat and he will control the car from an inclosed platform.

The car embodies many features of the one-man cars used in the United States, having doors with folding steps and interlocked control.

New Tramway in England

The Dearne District Light Railway of York, England, was formally opened for traffic on July 10. The company was organized over ten years ago, but was held up on account of the war. It is one of the few new tramway undertakings inaugurated in England in recent years. The line is 13 miles long and connects a number of mining towns and villages. As a precaution against decreased revenue, should mining operations cease, a special form of track construction was used at a cost of about £6,500 per mile of single track. Thirty single-deck thirty-six-passenger cars are employed.

Station Reconstruction Speeds Traffic

An increase of 500,000 passengers per annum is the result of the modernizing of Westminster Station of the Metropolitan District Railway. This station is now one of the most up-to-date of all the London underground stations as regards handling of traffic. The large circulating area, widened staircases and electric automatic passimeter ticket-issuing equipment have greatly facilitated the movement of traffic. The passenger inserts the correct fare in the ticket machine. This issues his ticket, dated and cancelled, releases the turnstile, registers him on a recorder and locks the turnstile after he has passed through.

New Railway Under Consideration.—N. B. Seblich, an electrical engineer of Berlin, is making an investigation of the traffic possibilities of an interurban electric railway to run from Mexico City to Cuernavaca, 75 miles. He represents Swiss financial interests, according to his statement. Power for operating the proposed line will probably be obtained from the plant of the Mexico Power & Light Company at Necaxa. Cuernavaca was the most popular tourist and week-end resort in Mexico in pre-revolutionary days.

Motor and Trolley Buses Denied in Croydon.—A committee of the House of Commons has denied the application of Croydon Town Council to run trolley buses and motor buses in connection with its tramways. Frank Pick, assistant managing director London General Omnibus Company, opposed the application, stating that it was the ambition of his company to be the sole provider of bus traffic in the metropolitan area and that wasteful competition should be eliminated.

Financial and Corporate

Good Year for Illinois Power & Light Corporation

The income from the properties of the Illinois Power & Light Corporation, Chicago, Ill., in 1923 showed a substantial increase over previous years. While the gross earnings were $27,930,854, an increase of 11.4 per cent over the year 1922, the net earnings were $9,119,047, or 24.6 per cent more than in 1922, the largest previous year. This is the first report of the company since the properties were merged, on May 25, 1923, into the Illinois Power & Light Corporation. The opinion is expressed by Clement Studebaker, Jr., president, that the consolidation of the properties formerly comprising the Illinois Traction System and the Southern Illinois Light & Power Company has proved in every way advantageous to the territories served, to the bondholders and stockholders and to the properties themselves.

DISPOSITION OF NET EARNINGS OF ILLINOIS POWER & LIGHT CORPORATION

Total net earnings		$9,119,047
Less fixed charges:		
Interest charges, etc.	$4,135,583	
Bond discount amortized	220,713	4,356,296
Surplus available for depreciation and dividends		$4,762,751
Dividend on preferred stocks, Illinois Power & Light Corporation and subsidiary companies		1,358,330
		$3,404,421
Appropriated for depreciation, in accordance with terms of trust indenture		761,943
Balance available for common stock dividends, etc.		$2,642,478
Dividend paid on common stock, $1 per share		400,000
		$2,242,478
Additional appropriation for depreciation		1,238,057
		$1,004,421
Adjustment of prior year's dividends from subsidiary companies		30,536
Balance, Dec. 31, 1923		$1,034,957

It is explained that since the formation of the new company the officers and engineers have been intensively studying its physical needs with a view to creating and maintaining the highest type of service in its various communities. This involves the consolidation of sources of power supply and the installation of the latest production and distribution methods and modern equipment. In consequence in addition to minor power plant and transmission line developments, many changes of first magnitude are contempated. These extend to new and enlarged power houses, construction of new transmission lines and improvements to the railroad department. Thus the power supply of the railroad between St. Louis and Springfield will be increased. Specifically listed among this work are six new electric locomotives, 100 new box cars and seventeen new one-man interurban cars. It is also stated that provision has been made for the purchase of motor coaches and for the adoption of present rolling stock equipment to one-man operation so as to permit more frequent and efficient service.

For the purpose of tying the company's operations more closely to the communities served, an intensive sale of its preferred stock to customers has been carried on by the investment department. More than $3,000,000 of this stock was disposed of in a few months to the public and employees, with the result that at the time of the annual meeting last April there were 7,390 preferred stockholders.

COMPARATIVE STATEMENT OF EARNINGS OF COMPANIES CONSTITUTING ILLINOIS POWER & LIGHT CORPORATION

	1919	1920	1921	1922	1923
Gross earnings from operations:					
Electric light and power	$6,471,155	$7,891,608	$9,209,945	$10,442,752	$12,400,998
Gas	1,122,384	1,302,671	1,623,829	2,195,048	2,722,533
Interurban lines	5,930,525	7,175,663	7,161,772	6,939,641	6,676,610
City lines	4,036,349	4,714,116	4,596,796	4,506,913	5,178,391
Heat	513,799	557,246	527,454	574,258	620,363
Water	68,645	71,926	77,872	90,415	100,190
Miscellaneous	249,721	381,140	302,215	315,584	231,769
Total gross earnings	$18,392,578	$22,094,370	$23,499,883	$25,064,611	$27,930,854
Operating expenses, maintenance and taxes	13,257,580	16,352,776	17,066,428	17,746,168	18,811,807
Net from operating	$5,134,998	$5,741,594	$6,433,454	$7,318,443	$9,119,047

Deferred Payment Plan Explained

Frank L. Dame, president of the North American Company, New York, N. Y., has announced the purposes of the "deferred payment" plan, in connection with the offering to the stockholders of an opportunity to purchase, subject to allotment, $10,000,000 aggregate par value of the company's preferred stock. He said that one purpose was to provide additional capital for the requirements of the company; another purpose is to afford to the stockholders a means of purchasing on deferred payments, a high-grade security, and a third reason is to give to the stockholders the full benefit of the present low money rates, by procuring for them a 4 per cent interest rate per annum on their deferred payments. The essential features of the "deferred payment" plan are the requirement of subscribers on or before Aug. 15, 1924, to make an initial payment of $20 per share of stock subscribed for, the remaining $30 of the purchase price being payable in three instalments of $10 each on Jan. 2, 1925, or April 1, and July 1, 1925. Stock certificates to be delivered to the subscribers upon completion of payments on the specified dates will in each instance carry all dividends paid on the preferred stock after the date of completion of payments.

Hearings on Property Valuations in Twin Cities Concluded

In the hearing before the Minnesota Railroad and Warehouse Commission to set a permanent rate of fare in the Twin Cities testimony has been concluded as to property valuations of the St. Paul City Railway and the Minneapolis Street Railway. Hearings on the operating expenses of the Minneapolis Street Railway have been held and in the case of the St. Paul City Railway the similar hearing was set to begin on Aug. 13.

It was predicted by Comptroller D. J. Strouse for the Minneapolis company that revenues for 1924 would fall $1,000,000 from the $8,504,294 total for 1923. He placed the probable total at $7,611,922.

On the property valuation of the companies several bankers testified for the company. Those who appeared included E. W. Decker, president of the Northwestern National Bank; R. W. Martin, of Dillon, Read & Company, New York; L. E. Wakefield, vice-president of the Wells-Dickey Trust Company; E. W. Webb, president of the Minneapolis Trust Company and W. B. Baird, vice-president of the Merchants Trust Company, St. Paul.

In effect this testimony went to show that traction securities are not so favorably regarded among investors as are other utility investments. Mr. Decker said the rate of return of the properties of the railway companies should be at least double the average rate of interest on the bonds issued by the companies.

Traffic on Increase in East Bay Cities

Electric railway traffic in the East Bay cities of California is increasing. The Key System Transit Company, Oakland, shows a gain of 1,614,238 in the number of passengers carried for the first six months of this year compared with the similar period last year. The semi-annual report shows the following:

Passengers Carried	1924	1923
Traction Division:		
Revenue passengers	38,512,998	37,869,303
Transfer passengers	10,435,625	10,084,985
Total traction division	48,948,623	47,954,288
Key Division:		
Revenue passengers	8,879,086	8,259,243
Entire System:		
Revenue passengers	47,392,084	46,128,546
Revenue and transfer passengers	57,827,709	56,213,531

Normal increase in population, given as the principal reason for this gain, does not tell the whole story. It is said that auto-parking conditions in the bay cities have driven many autoists back to the street cars. There is a forty-minute limit on parking in Oakland, but it has been found impossible properly to enforce this. As a result the business section is congested on week days with parked cars.

Interurban Doing Well

Management of Kansas City, Clay County & St. Joseph Line Alive to Changing Conditions

The operations of the Kansas City, Clay County, & St. Joseph Railway, Kansas City, Mo., for the year ended Dec. 31, 1923, show an increase in both gross and net income. The passenger revenue was $1,026,706, a net increase of $4,887 over 1922. Of this amount $15,304 was an increase on the Excelsior Springs Division and $10,416 a decrease on the St. Joseph Division. The number of passengers carried was 2,353,224. This is a net increase of 100,115, of which 125,807 was an increase on the Excelsior Springs Division and 25,692 a decrease on the St. Joseph Division. The complete line comprises 72 miles of track.

R. P. Woods, vice-president and general manager, explains that the year 1923 was an abnormal one for the farming industry and that on account of the depression both the through and the local business on the St. Joseph Division fell off materially since much of the business on this part of the road is made up of patronage incident to the farming industry. On the other hand business on the Excelsior Springs Division was low because the highways leading into the Springs were practically cut off during the entire year owing to highway rebuilding work. This made the business in Excelsior Springs the poorest which has been experienced there in many years. It is expected, however, that the completion of the hard surface roads will make business in Excelsior Springs this year a banner one.

Mr. Woods explains that extensive repairs to equipment were made during the year. Two-thirds of the passenger equipment was completely overhauled and repainted with the result that the equipment is in splendid condition so that if it should become necessary to make radical reductions in operating expenses the equipment account could be materially reduced without serious difficulty.

The pamphlet report of the company is a most complete and unusual one. Included in the statistics reproduced herewith are earnings from freight which cover the years 1915 to 1923. This is a most interesting comparison. Moreover, the tenor of the report indicates that the management is thoroughly alive to the need for the intensive cultivation of the riding habit and that it is going after business, both freight and passenger, intensively. Just as an instance, the trainmaster's entire time is spent riding the trains, seeing that all rules of the company are enforced, and that the equipment is properly handled. This official keeps in close touch with the dispatcher and advises him when necessary to add additional cars to any train on account of extra travel from any point.

Bus Line Sale Price Considered Too High

The plan to purchase the bus lines in St. Louis in the interest of the successor to the United Railways fell through when the committee representing the bondholders of the St. Louis Transit Company declined to advance the money needed to swing the deal. The Transit bondholders are understood to have held that the price asked was too high, especially when the bus company was operating merely on revocable permits issued by the Board of Public Service.

Col. Perkins, general manager for the receiver of the United Raliways, in his address in opposition to the proposed new bus lines, charged that although the Missouri Public Service Commission, in its valuation of the properties of the United Railways had not allowed anything for franchises the purchase of the bus lines for $2,400,000 would have placed a franchise value of more than $1,000,000 on the bus permits granted by the city.

He stated that if the new bus lines are opened the railway will have to increase its fare, curtail service and reduce the number of employees or cut the wages of all its workers. He also stated that the policy of granting permits for bus lines to compete with the existing railway had already made it difficult to obtain capital needed to reorganize the railway and lift the receivership.

W. Frank Carter, counsel for the bus company, denied that the price asked for the bus lines was exorbitant. He said that the company had already invested $1,400,000 in the system and had $700,000 in bank for additional buses, garages, etc. He said that the company planned to employ 800 men eventually and that this would more than offset any employees the railway might lay off because of bus competition.

Earnings in Atlanta Show Appreciable Decrease

Railway earnings of the Georgia Railway & Power Company, Atlanta, Ga., showed a decrease for July, 1924, compared with July, 1923, of $38,779 or a drop of nearly $1,300 a day. Out of the twenty-four city car lines operated by the company, nineteen showed substantial decreases for the same month, and July, 1923, the company states, was a month far below normal.

The reason for this drop in earnings is attributed by the company "to the in-

OPERATING DATA OF THE KANSAS CITY, CLAY COUNTY & ST. JOSEPH RAILWAY

COMPARATIVE INCOME STATEMENT

Railway operating revenue:	1923	1922
Railway transportation, St. Joseph division	$755,191	$772,841
Excelsior Springs division	466,525	425,652
	$1,221,716	$1,198,493
Other railway operations, St. Joseph division	6,333	9,498
Excelsior Springs division	6,991	4,299
	13,325	13,797
Total operating revenue	$1,235,041	$1,212,291
Railway operating expense:		
Way and structures	$107,071	$101,987
Equipment	85,695	68,533
Power	107,715	136,177
Conducting transportation	228,032	223,924
Traffic	7,966	6,856
General and miscellaneous	157,354	154,882
*Depreciation	100,060	100,004
Taxes (not including federal income tax)	29,094	30,396
	$845,087	$822,759
Net railway operating income	$389,954	$389,531
Net operating income:		
Interest from funded securities	2,490	2,677
Interest from unfunded securities	4,039	2,701
Interest from sinking fund	1,509	486
	$8,038	$5,865
	$397,992	$395,397
Deductions from gross income:		
Interest on funded debt	161,450	161,304
Gross income	$236,542	$234,093
Less estimated federal income tax	24,892	20,262
Balance available for surplus and dividends	$211,649	$213,830

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* The auditors have taken the accrued depreciation, less expenditures for renewals and replacements, $79,926 as an appropriation of surplus. Add that amount to check their surplus net income of $291,576.

SUMMARY OF COMPARATIVE OPERATING EXPENSE†

Operating Expenses	1923	1922	Cost per Car Mile (Cents) 1923	Cost per Car Mile (Cents) 1922
Way and structures	$183,277	$178,181	9.87	10.23
Equipment	101,783	84,575	5.45	4.85
Power	137,578	143,942	7.41	8.26
Conducting transportation	228,032	223,924	12.28	12.85
Traffic	7,966	6,856	0.43	0.39
General and miscellaneous	157,356	154,884	8.47	8.89
	$816,992	$792,362	43.97	45.47

† Not including taxes.

OPERATING STATISTICS

1923

	Total	Average per Day	Average per Car-Mile (Cents)	Average per Track Mile
Operating revenue	$1,235,041	$3,383	66.51	$15,521
Passenger revenue	1,013,244	2,776	64.41	12,734
Freight revenue	194,988	534	84.07	2,450
Operating expenses	815,992	2,235	43.94	10,255
Car-miles (passenger)	1,572,912	4,309		
Car-miles (freight)	231,921	635		
Car-miles (service)	52,030	142		
				Average Fare
Revenue passengers	2,322,817	6,391	1.26	43.62
			Kw.-Hr.	Cost per Kw.-Hr.
Power, kilowatt-hours	7,559,720	20,711	4.07	1.527
Car-hours (passenger)	84,423	231		
Car-hours (freight)	13,018	36		
Passenger trains, regular	....	88		
Freight tonnage	96,351	269		

FREIGHT STATISTICS

Year	Gross Revenue	Gross Tons	Less Carload Revenue	Carloade Revenu
1915	$59,554	19,970	$54,419	$5,135
1916	69,723	24,177	64,007	5,716
1917	82,676	28,828	74,472	8,204
1918	98,682	37,464	88,024	10,657
1919	112,955	38,327	103,606	9,349
1920	158,252	40,945	148,942	9,303
1921	172,254	36,900	159,520	12,733
1922	176,248	43,180	156,258	19,989
1923	194,988	96,352	148,146	46,842

crease in unregulated jitneys" and, it is added if the loss continues, it will result in "the inevitable disruption of Atlanta's transportation system." The statement then says:

> The railway last year failed by more than $500,000 to earn a reasonable return on the Public Service Commission's minimum valuation of the property. It cannot continue to bear the burden of such losses.
>
> The facts about the transportation situation are being put before the people of Atlanta in the expectation that, in their own interests, they will see that the alarming condition is speedily remedied.

Directors Vote Stock Dividend in Brooklyn.—Through an increase in its capital stock from $12,000,000 to $16,000,000, authorized previously by the Transit Commission, the Brooklyn City Railroad directors on Aug. 13 declared a stock dividend of 33⅓ per cent, or $4,000,000. The dividend is payable Sept. 30 to stockholders of record Sept. 5. The regular quarterly dividend of 25 cents a share, payable Sept. 2 to stockholders of record Aug. 16, also was declared. The company's letter to its stockholders last February pointed out that since October, 1919, when the properties formerly leased to the Brooklyn Heights Railroad were returned, the company withheld dividends and spent more than $4,000,000 out of earnings to increase its facilities.

Union of Properties Viewed With Interest.—Barrons, New York, states that it is reported the Piedmont & Northern Railway, a prosperous electrified railroad in the cotton mill belt of the Carolinas controlled by James B. Duke and his associates, is to be united, both physically and financially, with the now bankrupt Georgia & Florida. In commenting on the report that paper says that if this trade goes through, railroad men will watch the result with interest, for James B. Duke has made a success of every enterprise he has undertaken, whether in tobacco, fertilizer, power, textiles or railroads.

Option Sought on Interurban Shares.—A report is current in Indianapolis that members of the firm of Ball Brothers, glass jar manufacturers, of Muncie, Ind., are seeking a six-months' option on 1,000,000 shares of common and an equal number of shares of second preferred stock of the Union Traction Company, Anderson, Ind. Officials of the railway said that acquisition of the stock, if that was accomplished, would not change the present ownership status of the company, as members of the Ball Brothers firm as stockholders had always taken an active interest in the company's affairs. Edmund F. Ball, a member of the Ball Brothers firm, is a director in the traction company.

Mortgage for Jersey Merger Filed.—The Public Service Gas & Electric Company of New Jersey filed a mortgage for $31,834,000 to the Fidelity Union Trust Company, Newark, recently as part of the refinancing plan of the corporation, made possible by the merger two months ago of the Public Service Gas Company, the Public Service Electric Company and the United Electric Company of New Jersey. The mortgage will secure an issue of bonds bearing 5½ per cent interest and maturing in 1959.

Fort Wayne & Northwestern Deal Approved. — The Public Service Commission of Indiana has authorized the Indiana Service Corporation to buy 95 per cent of the outstanding capital stock of the Fort Wayne & Northwestern Railway, which operates 41.75 miles of interurban line between Fort Wayne and Garrett, with branches to Kendallville and Waterloo. The sale price will be $472,200. The corporation will issue $661,760 of 5 per cent bonds at 82 per cent of par. It will assume $355,000 of outstanding bonds of the company at an agreed price of $328,375. The Indiana Service Corporation will have to pay $800,575 and assume liability for the bonds outstanding. At 82 per cent of par the $661,760 face value of bonds will yield $542,643. The difference between this sum and the total cost, or $257,932 will be paid in cash secured from other sources.

Six Months' Operation Results in Deficit. — The Worcester Consolidated Street Railway, Worcester, Mass., carried 22,803,031 revenue passengers the first six months of this year, compared to 25,139,474 for a similar period in 1923. The operating revenue for the same period was $2,135,528 compared with $2,366,923 for the same period of last year. A deficit of $1,501 was reported for the period.

Meeting to Consider Stock Increase.—A special meeting of the Savannah Electric & Power Company, operating in Savannah, Ga., has been called for Aug. 29 to vote on an increase in stock by $500,000. The increased stock is to be made first preferred or debenture stock designated as series "B," in all respects the same as series "A" stock of this class now outstanding except as to dividend rate and redemption price. Directors recommend that the dividend be 7½ per cent, against 8 per cent being paid on the series "A" stock.

Surplus for Six Months.—For the six-month period ended June 30, 1924, the Eastern Massachusetts Street Railway, Boston, Mass., reports operating revenues of $4,998,720 against $5,533,499 for a similar period a year ago. Operating expenses were $4,355,957 in the first six months of 1923 and $3,901,358 for the period from January-June of 1924. After payment of interest charges and dividends the surplus this year was $95,210 against a deficit of $52,012 for a similar period in 1923.

1925 Budget Lower.—The City Council has tentatively allowed the Seattle Municipal Railway Department $6,354,000 for 1925, in making out the 1925 budget allowances. This is a reduction of approximately $420,000 over the allowance for 1924. The budget committee cut $31,000 from the estimate of D. W. Henderson, general superintendent. Of this amount $25,000 was a power item. The committee based this reduction on the expectation that the city will furnish an increased amount of power for the line during 1925. Mr. Henderson advised the committee that the revenues of the system for the first six months of this year were $3,047,958. He believes they will be more than $6,000,000 for the year. There have been fewer car riders, he said, month for month, than last year, but by the end of the year, the average will be about the same. The 1923 revenue was less than $5,000,000, but Mr. Henderson said the 5-cent fare was partly responsible.

Abandonment Approved.—Abandonment and dismantling of the line of the Aurora, Elgin & Fox River Electric Company, Aurora, Ill., between Fox River park and Yorkville was authorized by the Illinois Commerce Commission on Aug. 6. At the same time the commission issued a certificate to the company to operate buses between Yorkville and Aurora.

Purchase Will Go Before Voters.—Members of the City Council of Seattle, Wash., state that the proposal to buy the Seattle & Rainier Valley Railway for operation in connection with the city-owned system will probably be submitted to the voters, if negotiations to purchase the lines are successful.

Purchases St. Cloud Property. — H. M. Byllesby & Company announced recently its purchase of the St. Cloud Public Service Company and subsidiary companies, which operate electric light and power, gas and railway properties in St. Cloud and supply electric power and light services for fifty-three other communities in Central Minnesota. It is planned to operate the properties as a division of the Northern States Power system. The railway system comprises 8 miles of line.

Stock Issue Petition Heard.—The Indiana Public Service Commission has heard the petition of the Southern Indiana Gas & Electric Company, Evansville, Ind., for permission to issue $500,000 of 7 per cent preferred stock at par. Officers of the company said they planned to sell most of the stock to the customers of the company. They said the company was carrying out a program of extensions and improvements costing approximately $1,454,000. Securities totaling $415,000 as a part of this program, were issued by the company with the consent of the commission the first of the year.

Seeks Abandonment of Certain Lines.—The Newport News & Hampton Railway Gas & Electric Company, Hampton, Va., has petitioned the State Corporation Commission for permission to abandon certain lines in Hampton and Elizabeth City and to be relieved of the obligation of paving and repairing between tracks.

Prices for Substations to Be Announced.—Prices and terms on which the city of Seattle may acquire the railway substations in the city, still owned by the Puget Sound Power & Light Company, will probably be announced shortly. A board of appraisers has been appointed to set the terms upon which the five substations may be purchased. The stations must be acquired by the city before energy to be produced by the municipality at Skagit can be utilized in place of the current that the city, meanwhile, is purchasing under contract.

Line Resumes Service. — The Plymouth & Brockton Street Railway, Plymouth, Mass., which discontinued through service on July 6, has been reopened. The company has filed with the Massachusetts Department of Public Utilities a new tariff, revising the fare limits. Special provisions are made for working trips, with little or no increase in the rate of fare.

Protective Committee at Work.—A committee has been appointed to dispose of or liquidate the property of the Cleveland & Chagrin Falls Railway and the Cleveland & Eastern Traction Company, both operated by the same management in Cleveland, Ohio. The committee has entered into an agreement with the Guardian Savings & Trust Company, Cleveland, for the deposit of the first mortgage bonds on the property. No plan has yet been announced by the committee as to the best method of operation.

Bond Issue for Houston Line Sold.—It is announced by Ed Kennedy, promoter of the Houston, Beaumont & Orange Interurban Railway, Houston, Tex., that a bond issue of $5,000,000 with which to construct the proposed line has been sold to S. P. Thayer & Son, Washington, D. C. He said that the contract for building the road has been awarded to the J. D. Davis Construction Company, Atlanta, Ga. The contract stipulates that the line shall be completed in fifteen months, dating from July 20. Deeds to 82 miles of right-of-way have been obtained, leaving only 7 miles of right-of-way still to be acquired.

File Suits.—The Dayton, Springfield & Xenia Southern Railway, the Oakwood Street Railway and the City Railway, all operating in Dayton, Ohio, have brought suit in the federal court to prevent M. L. Beard, treasurer of Montgomery County, from collecting more than 60 per cent of their 1923 taxes. The suits charge that the holdings of utilities are assessed at 100 per cent of their value, while in both Greene and Montgomery Counties other property is assessed at 60 per cent of its value. This is declared to be discriminatory.

Funds Deposited to Pay Interest.—Holders of the first mortgage 4 per cent bonds of the United Railways, St. Louis, Mo., were recently notified that funds are on deposit with the Bankers Trust Company, New York, and the Union Trust Company, St. Louis, to pay the interest that is due on the bonds plus six months interest on that sum, totaling in all $624,000. Interest on the $30,300,000 of general mortgage 4s. due Jan. 1, 1924, was not paid. The mortgage carried a provision providing a period of grace of six months before foreclosure proceedings could be instituted.

Tit for Tat in Denver.—The Denver Tramway has presented the city of Denver, Col., with a bill for $67,000, for the cost of moving its tracks from the old Sixteenth Street viaduct, stating that the former Mayor agreed that the city would pay for this work. The city presents the tramway with a bill for $125,000, the tramway's portion for the construction of the new viaduct, saying that such was the agreement between the company and the former mayor. The company says it made no such agreement. The tramway owes the city $210,000 for back franchise taxes. The tramway answers that if the city will deduct the $67,000 it owes the tramway, the money will be paid.

Personal Items

H. A. Mitchell Heads Californians

Interurban Executive Has Been Elected President of the California Electric Railway Association

H. A. Mitchell, vice-president and general manager of the San Francisco-Sacramento Railroad, was elected president of the California Electric Railway Association at the annual meeting of that organization held in San Francisco on July 7. He is one of the best known and youngest electric railway executives on the Pacific Coast.

Mr. Mitchell was born in San Francisco and was educated in the public schools of his native city. His first employment was with the forces of the Pacific Gas & Electric Company as an office boy. This was in February, 1898. Among the properties of that company is the electric railway system in Sacramento. Mr. Mitchell remained with this concern until August, 1906, when he entered the employ of the Fleishhacker interests. They control the Reno Traction Company, in Reno, Nev., and the Central Traction Company, operating between Stockton and Sacramento, Cal. Here he remained in various capacities until Jan. 1, 1913. At the time he resigned Mr. Mitchell was general manager of the Central Traction Company and the Reno Traction Company. On Jan. 1, 1913, he entered on his present duties with the San Francisco-Sacramento Railroad, known as the Sacramento Short Line.

H. A. Mitchell

Mr. Mitchell is also president of the Pacific Railway Club, which has for its object the advancement of the science of railroading and the best interests of the railroad profession and which aims to bring into closer relationship the men employed in various branches of railroad work on all Pacific Coast roads. He is a resident of Oakland and his headquarters are located in the San Francisco-Sacramento Railroad terminal at Fortieth Street and Shafter Avenue in Oakland.

George L. Maltby Resigns

George L. Maltby, for the past fifteen years superintendent of the Jamestown Street Railway, the Jamestown, Westfield & Northwestern Railroad and the Chautauqua Traction Company, all of Jamestown, N. Y., as well as the city bus lines of the first-named company, has tendered his resignation, effective at once. He has organized the George L. Maltby Motor Car Company in Jamestown and will erect a modern service station for Pierce-Arrow motor cars, trucks and buses. Before Mr. Maltby's association with the utility properties in Jamestown, he was city passenger agent and local representative of the freight department of the New York Central lines. During his many years in the railroad and traction business he has established a wide acquaintance, not only in Jamestown but throughout Chatauqua County. A successor to Mr. Maltby at Jamestown has not yet been announced.

Bert Penoyer, maintenance of way engineer of the Schenectady Railway, Schenectady, N. Y., has resigned to become connected with the Kellam & Shaffer Company, Inc., dealers in stone and masons' supplies. His resignation took effect on Aug. 15 and on Sept. 15 he will take up his new duties. After ten years of varied business life, Mr. Penoyer entered the employ of the Schenectady Railway in 1902. Four years later he was made engineer maintenance of way, which position he has occupied since. In announcing the resignation, E. M. Walker, president, said that it was with sincere regret that he was releasing Mr. Penoyer. "Mr. Penoyer has grown up with the company," he added, "and it is only because we believe that his personal interests will be advanced by his new business connection that we considered his resignation at all."

Richard E. Weber, assistant maintenance of way engineer of the Schenectady Railway, Schenectady, N. Y., has been appointed maintenance of way engineer to succeed Bert Penoyer, resigned. Mr. Weber, has been assistant in the department, for two and a half years and is conversant with the duties of the position. He went to Schenectady from Rochester. Mr. Weber is a graduate of Cornell University.

R. J. Smith, vice-president and general manager of the Tri-City Railway, Davenport, Ia., will take over as additional duties the work formerly performed by Clark G. Anderson, vice-president and general manager of the Clinton, Davenport & Muscatine Railway. Mr. Anderson's resignation from the Moline property was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug 9.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

More Electric Equipment Exported

During the fiscal year ended June 30, 1924, the number of electric locomotives exported from the United States was seventy-four, an increase of twenty-six over the year before. The value of these exports, however, was only $1,955,646 this year compared with $2,758,191 for the year ending June 30, 1923. Electric passenger cars exported during the 1924 fiscal year numbered 89 with a value of $683,491—an increase of only five in number but of $326,009 in value over the year before.

Recent Arrivals

Since publishing in the July 19 issue of the ELECTRIC RAILWAY JOURNAL the list of companies seeking space allotment for the exhibit at the annual convention of the American Electric Railway Association, to be held in Atlantic City, next October, orders for space have been received from 18 companies. They are as follows:

Robert Bosch Magneto Company.
Brockway Corporation.
The Bassick Manufacturing Company.
The C. G. Spring & Bumper Company.
B. J. Carney & Company.
Clark Equipment Company.
Farnham Nelson Company.
Hoe Corporation.
The Indianapolis Switch & Frog Company.
Janney, Steinmetz & Company.
Magnetic Signal Company.
Princeton Tire & Rubber Company.
Public Service Railway Company.
The Railway Materials Company.
E. J. Thompson Company.
Waynesboro Nut Lock Company.
Wilson-Imperial Company.
P. W. Wood.

$1,000,000 Bonus Payments Made by General Electric

The General Electric Company, Schenectady, N. Y., on Aug. 4 paid to those of its employees who have been with the company continually for five years or more, more than $1,000,000 in supplementary compensation. The bonus payments are for the six months ended June 30 last, and amount to 5 per cent of the earnings of the employees during that period. A total of 27,412 employees shared in this distribution, which was paid largely in bonds of the G-E Employees' Securities Corporation. The total amount paid was approximately $1,172,000.

Pressed Steel Car Company Passes Dividends

The Pressed Steel Car Company, New York, N. Y., omitted its regular quarterly dividend of $1.75 on its preferred stock and $1 on its common stock on Aug. 5, both of which were due at this time. Business for the year has been below normal, F. N. Hoffstot, president of the company, said, but added that he expected net earnings for the year would be sufficient to enable the board to resume payment of dividends on both the preferred stock and common stock at the end of the fiscal year. Action on the preferred was deferred at the suggestion of the company's counsel, who advised the directors that dividends for any fiscal year should only be paid from the earnings after the same had been determined at the end of that year.

Treatment of Timber Fellowship Founded

E. R. Weidlein, director of the Mellon Institute of Industrial Research of the University of Pittsburgh, has announced the founding of an industrial fellowship on the treatment of timber. This research, which is being sustained by the Grasselli Chemical Company of Cleveland, Ohio, and is being conducted by Dr. A. M. Howald, has for its purpose a study toward the improvement of the methods of applying zinc chloride in the wood-preservation industry. Investigational work which was begun during 1923 will be continued throughout the present year. An experimental wood-impregnating plant is maintained for practical tests of processes. Research is being done to increase the permanence of zinc chloride treatments of timber by the addition of petroleum oils.

Rolling Stock

Municipal Railway of St. Petersburg, Fla., has purchased fifteen new cars at a cost of $132,700. The order was placed with J. G. Brill Company. The cars are of the one-man type and seven will be double truck.

Seattle Municipal Railway, Seattle, Wash., has announced that the date for opening bids for furnishing from 75 to 125 cars has been indefinitely postponed by order of the Board of Public Works. The original date was set for Aug. 15.

Massachusetts Northeastern Railway, Haverhill, Mass., has recently placed in service on its eastern division with headquarters at Amesbury ten new light-weight double-truck, one-man safety cars. These cars were built by the Wason Manufacturing Company, Springfield, Mass., and are similar in general design to other light-weight cars manufactured by the same carbuilder.

Union Traction Company of Indiana, Anderson, Ind., has contracted for fifteen all-steel interurban passenger cars. The new equipment is being purchased as part of a program of additions and betterment planned for this year aggregating about $750,000. The company has financed the improvements.

Track and Line

British Columbia Electric Railway, Vancouver, B. C., is repaving on Main Street at a cost of $50,000.

Key System Transit Company, Oakland, Cal., has started work on the extension from the Piedmont Avenue line, along the right of way to Oakland Avenue, the terminus of the line in the city of Piedmont. The work is in compliance with the recent decision of the State Railroad Commission authorizing the Key System to operate a train and ferry service into the city of Piedmont from San Francisco.

Worcester Consolidated Street Railway, Worcester, Mass., has been authorized by the Massachusetts State Department of Public Utilities to extend its tracks on Burncoat Street.

Harrisburg Railways, Harrisburg, Pa., will start work on relaying track in State Street, to be followed by the double-tracking of Second Street, above Schuylkill Street. Both of these operations are preliminary to the paving construction to be begun by the city in these streets, and are undertaken at this time to avoid paving cuts later.

Tri-City Railway, Davenport, Iowa, has completed work of laying new track on West Third Street between Warren and Fillmore Streets in Davenport. The cost was approximately $40,000. The double track has been replaced in accordance with the agreement with the City of Davenport at the time when the rerouting plan was approved.

Des Moines City Railway, Des Moines, Iowa, has started work on the extension of the Clark Street line and expects service will begin Sept. 1. Workmen began to set poles and string the high-tension wires for the line. A portion of the line will be double tracked. The cost of the project is estimated at $40,000.

Illinois Power Company, Springfield, Ill., will soon undertake the Fifth Street project laying new double rails and new pavement between Washington and Monroe Streets.

Indiana Service Corporation, Fort Wayne, Ind., has sent out calls for bids for the erection of a complete block signal system on the Fort Wayne-Huntington section of the Lafayette Division.

Metal, Coal and Material Prices

Metals—New York	Aug. 12, 1924
Copper, electrolytic, cents per lb.	13.625
Copper wire base, cents per lb.	15.50
Lead, cents per lb.	7.75
Zinc, cents per lb.	6.54
Tin, Straits, cents per lb.	51.625
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.20
Somerset mine run, Boston, net tons	2.075
Pittsburgh mine run, Pittsburgh, net tons.	1.875
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons.	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.35
Weatherproof wire base, N. Y., cents per lb.	18 00
Cement, Chicago net prices, without bags.	2 20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.05
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.625
Turpentine (bbl. lots), N. Y., per gal.	$0.90

Dependable
to the
Nth Degree

Peacock Staffless Brakes

Meet the emergency requirements

OFTEN when brake shoes are worn the ordinary hand brake will not operate. Often when there is too much chain slack, the ordinary hand brake jams.

Peacock Staffless Brakes have great chain-winding capacity. They hold the cars no matter how worn the brake shoes may be.

Peacock Staffless never jam. They can take up unlimited amount of chain—in fact up to 144 inches.

They are dependable under the most adverse conditions—on the steepest grade, with a full load—they never fail to stop the car smoothly and swiftly.

It is this extraordinary dependability of Peacock Brakes that makes them the standard equipment on most of the prominent electric railway systems.

Specify them for your cars!

National Brake Company, 890 Ellicott Square, Buffalo, N. Y.

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Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
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PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER
Incorporated
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ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
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Railway Audit and Inspection Company, Inc.
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New Orleans Pittsburgh
BRANCHES
Baltimore Atlanta
Chicago St. Louis

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

"Repainting Done Inside and Out for $125.
per Double-Truck Car"

Says the Eastern Massachusetts St. Ry. Co. of Boston.

Quoting further from the letter received from the Superintendent of Rolling Stock and Equipment, of this large New England property: "Our company has used the DeVilbiss Spray System of painting for two years. We have by this method been able to reduce our cost of painting very materially * * * and are in a position to paint our rolling stock at shorter intervals."

Improvement in quality of work—saving of time—lowered labor costs, are noteworthy advantages made possible by the DeVilbiss Spray-painting System on electric railway car and equipment painting.

Let us work with you. Interesting operation and equipment facts will be gladly mailed. Address—

THE DeVILBISS MFG. CO.
272 Phillips Ave. TOLEDO, OHIO

The DeVilbiss Spray Gun

The DeVilbiss Spray Gun provides for the most advantageous application of any paint or varnish material. It embraces 17 important, distinctive features, among which are a "Self-centering nozzle," a "Quick detachable spray head," "All parts interchangeable," "Simplicity of design," "Ease of cleaning," and "One model for all purposes." It insures the utmost in spray gun value and service.

DeVilbiss
Spray-painting System

[Complete Equipment for Every Painting Requirement]

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The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK *Street Railway Inspection* DETECTIVES 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

A. E. R. A. CONVENTION

Atlantic City, N. J. October 6—10 inclusive

This year
the keynote is
"MODERNIZED
EQUIPMENT"

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Complete Convention Service

An editorial program covering every phase of modernized electric railway activity, *before, during* and *after* the Convention.

A circulation which reaches 99% of the entire electric railway field—the stay-at-homes as well as the Convention Delegates.

An advertising opportunity which the manufacturers of modernized equipment of any kind—used by or useful for a billion dollar industry—cannot afford to overlook.

Annual Convention Number dated September 27

A complete volume on the theme of "Modernization," written by recognized authorities. The big opportunity to ally your products with the thinking of the industry in the biggest single sales factor in the electric railway industry.

Three Daily Convention Issues dated October 7, 8, 9

The only way to reach every delegate at the Convention. Distributed on three mornings at the breakfast table and at the pier.

Annual Convention Report Number dated October 11

The first and only complete report of papers, proceedings and discussion—mailed 24 hours after the close of the Convention.

Send for further details and advertising space rates

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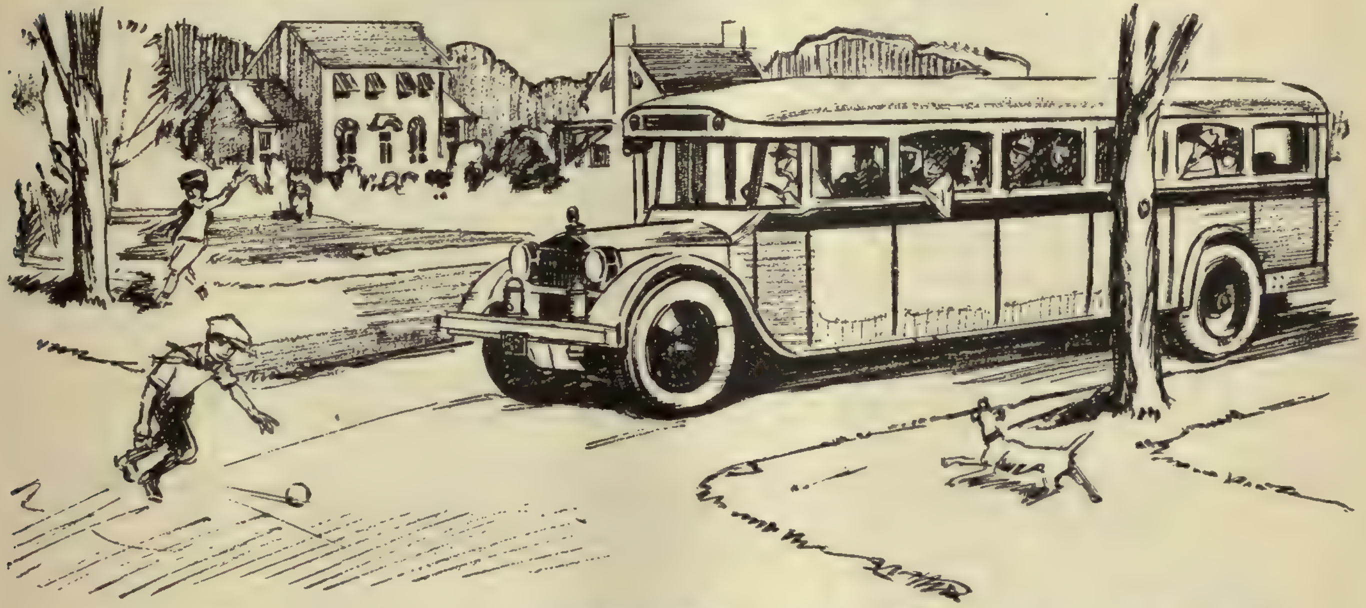
Member A.B.C., A.B.P., A.E.R.A.

HUCK DOUBLE REDUCTION BUS AXLE

Made by Sheldon under Huck patents



BRAKES!!!

IN emergencies—and in the routine of stopping a bus every few minutes—the brakes of the Huck Axle are swift, sure, but gentle.

Big brakes, with 21-inch high carbon hard steel drums that resist wear. The cams float and are not anchored or journaled, making the shoes self energizing, the rotation of the drums drawing them into increasingly tighter contact and slowing down the bus rapidly to a smooth stop with very little effort. These shoes cover practically the entire circumference of the drum, avoiding distortion of the drum. There is a marked saving in lining expense, because the wear is evenly distributed.

Other good features of the Huck Axle,
the axle that is good to your engine:

Greater road and overhead clearance permitting lower bodies.

High and constant efficiency at all speeds.

Higher gear ratio can be used, resulting in less wear on the engine, long life and low maintenance cost of axle.

Perfect lubrication.

Positive alignment insures quietness.

Lowest upkeep cost of any axle.

Accessibility of every part.

Easy starting for heavy loads.

Combines best features of chain, worm and bevel gear drives.

Write for your copy of "The foundation for better buses", describing this axle in full detail

Sheldon Axle & Spring Co.

Huck Axle Division Wilkes-Barre, Pennsylvania

0320-3

Make your order book

—your store house

"Everything Electrical" under the cover of one order book. List whatever you need, from a lamp socket to a flood light; send the order in to our nearby Distributing House and your needs will receive prompt attention.

The Western Electric Company distributes the products of over one hundred electrical manufacturers, whose names are household words in the trade and the quality of their products the standard by which similar products are judged. Put it up to Western Electric to supply your regular and emergency needs.

Western Electric

OFFICES IN FORTY-NINE PRINCIPAL CITIES

Economy in track renewal by using old track bed

Carnegie Steel Cross Ties were recently used in track renewal work in St. Louis.

Every other wooden tie was removed from the concrete foundation and a Steel Tie substituted. These were placed three feet center to center. Then the whole structure was concreted to the level of top of Steel Ties. Thus a thoroughly satisfactory track was obtained at very low cost.

Trebled capacity for the manufacture of Steel Cross Ties assures prompt delivery.

Booklet—"Steel Cross Ties"—on request
May our representative call?

CARNEGIE STEEL COMPANY
GENERAL OFFICES—CARNEGIE BUILDING
434 FIFTH AVENUE
PITTSBURGH, PA.

1689-A

In Repairing

Begin at

THAT is, with the track. Make the track right and the rolling stock will need very little repairs.

A street car is not a caterpillar tractor. Neither is it a tank.

It is designed and built to run on a resilient, easy-riding, noiseless track—if you want to get your money's worth out of it.

The only kind of track that is permanently this way is the Dayton Resilient Track.

There is a world of proof ready for you—if you will have it!

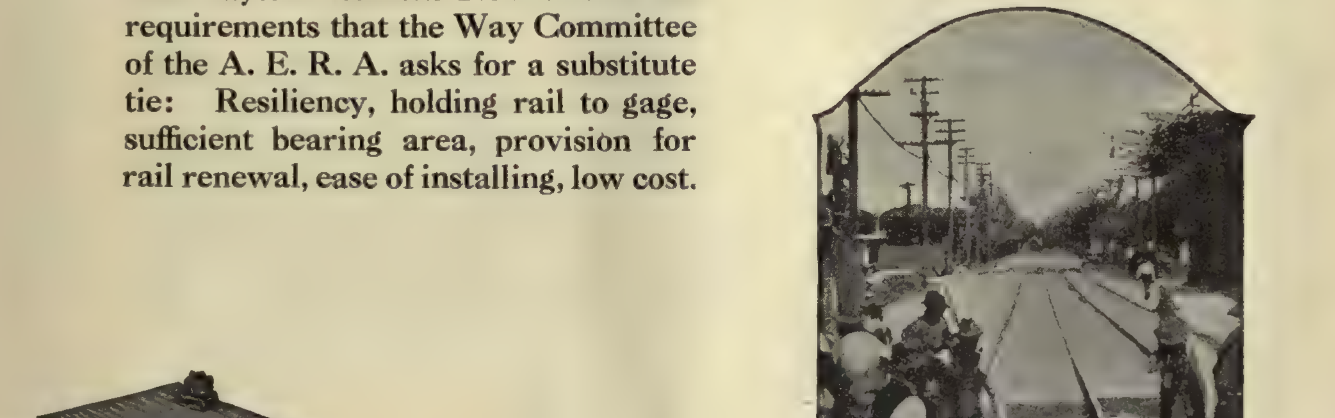
The Dayton
Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio

Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

DAYTON

Rolling Stock
the Beginning

The Dayton Resilient Tie meets all the requirements that the Way Committee of the A. E. R. A. asks for a substitute tie: Resiliency, holding rail to gage, sufficient bearing area, provision for rail renewal, ease of installing, low cost.

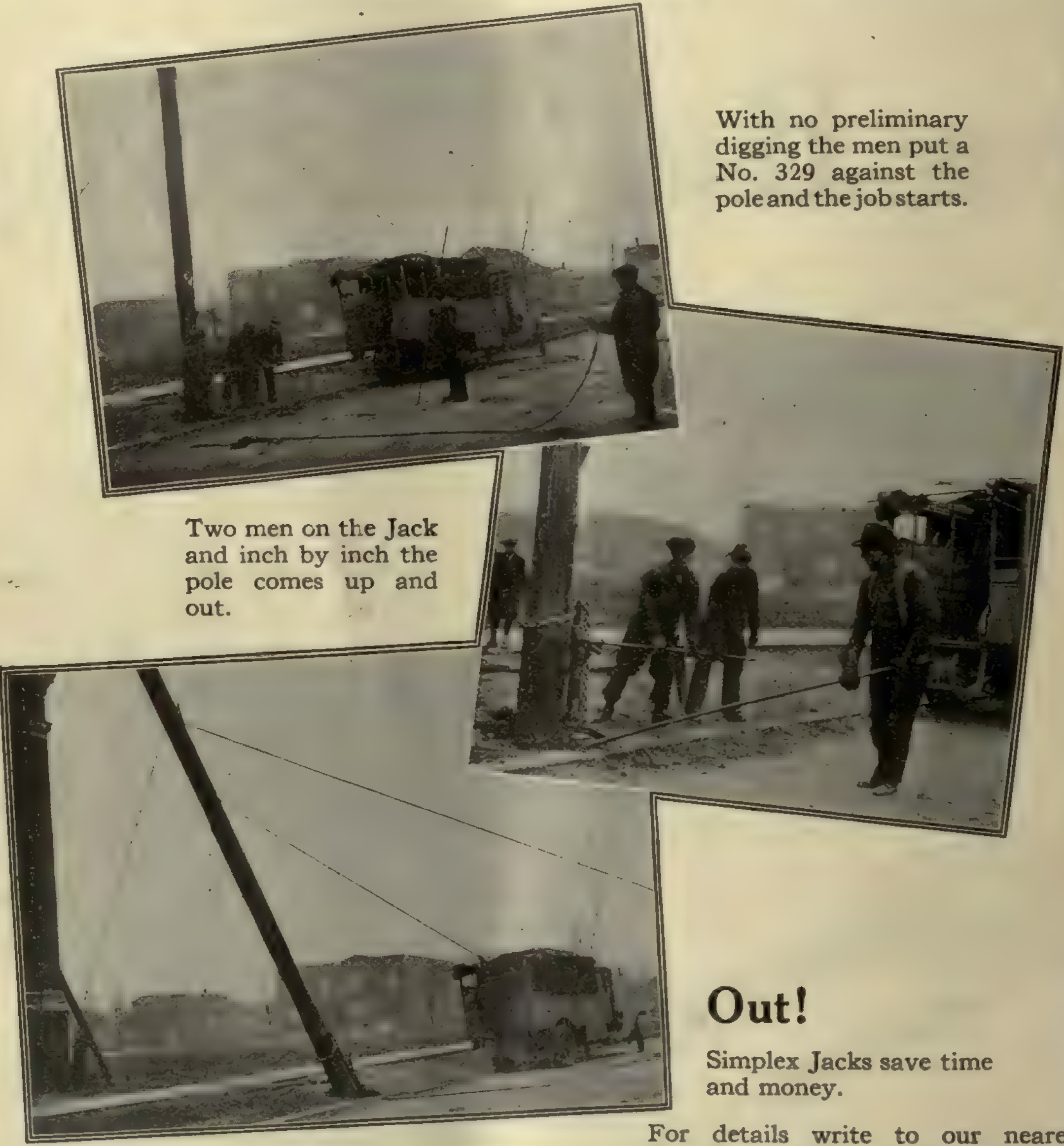


Resilient
TIE

"Jack 'em out" **SIMPLEX** "Jack 'em out"

JACKS JACKS

For a Long Pull and a Strong Pull You Can't Stall a Simplex Jack



With no preliminary digging the men put a No. 329 against the pole and the job starts.

Two men on the Jack and inch by inch the pole comes up and out.

Out!

Simplex Jacks save time and money.

For details write to our nearest Distributing House or Western Electric Company, 100 East 42nd Street, New York City.

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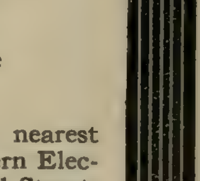


You may be sweltering now—

But snowball time is coming!

We do not say this to comfort you —but to Sound a Warning:

For the months slip by quickly and next month you should begin preparing for cool—cooler—then cold—weather.

To overcome weather conditions, we manufacture certain of our street railway lubricants in two grades: one grade for cold weather; one for summer.

* * *

There is good reason for this.

All oils tend to become a little thicker, a little sluggish in cold weather.

Now, fluidity of all oil is expressed in terms of viscosity. Viscosity varies with temperature. In the application of lubricants to street cars it is the operating temperature that counts. As the weather gets colder, the oils you used all summer will thicken. They will not then feed as freely. You can't change the temperature, but you can change the oils to compensate.

But weather doesn't change at a given date, so here's what we recommend:

Compensate gradually. Begin in the middle of September adding steadily small quantities of *lighter* oils to the lubricants now on the cars. This will gradually lower the viscosity, keeping it normal all the time as winter comes.

So, now is the time to begin changing over to

TEXACO **WINTER** Electric Car Oil
TEXACO **WINTER** Air Compressor Oil
TEXACO **WINTER** Gear Lubricant
TEXACO **WINTER** Track Lubricants

Then all the time, even in the middle of winter, you will be fully protected by these carefully refined Texaco Lubricants.*

* * *

As conditions vary throughout the country, watch the thermometer more than the calendar, and you will not be caught off guard.

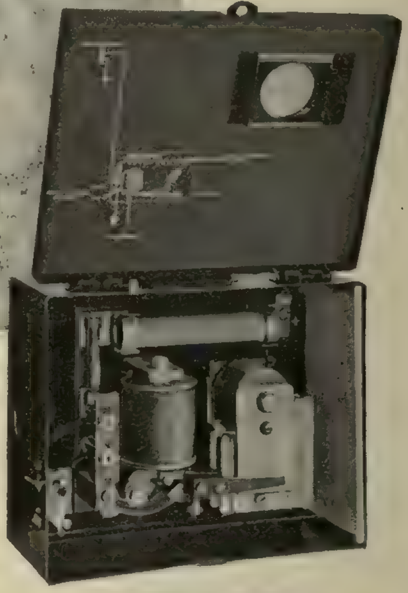
We have worked out an interesting and economical technique on roads all over the country and we will consider it a privilege to have our Texaco Lubrication Engineers discuss it with you in person.

* * *

There is a Texaco Lubricant for every purpose; for rolling stock or power plant—everywhere along the line.

*In Spring, reverse the process, gradually raising the initial viscosity of the lubricants so that, under the heat of summer, the oils will "fall back" to their proper fluidity.

THE TEXAS COMPANY, U. S. A.
Texaco Petroleum Products
ELECTRIC STREET RAILWAY DIVISION
17 Battery Place, New York
OFFICES IN PRINCIPAL CITIES



New Type Consolidated
Magnetic Switch

When winter comes in Washington, D. C.

Car heaters will function automatically and economically because they will have

CONSOLIDATED

Visible Thermostats with the new type magnetic switches

on 236 cars of the Capitol Traction Company.

Investigate the new CONSOLIDATED Thermostat control equipment with visible thermostat and simplified magnetic switch. Then do as Washington did—order.

Consolidated
Visible
Thermostat

Consolidated Car Heating Company
Albany, New York
New York, N. Y. **Chicago, Ill.**

How much Friction are you Paying for?

THE answer of this question depends principally upon the efficiency of the lubrication of your equipment. You know, however, that you are paying for friction every day your plant is in operation.

Only by using proper lubricants in the proper places can friction be held to a minimum. Friction, you know, means the rubbing together of two surfaces. Proper lubrication means the use of an oil or grease which will form and maintain an efficient, protecting film between two surfaces. To select the proper lubricant for each bearing is vitally important.

Standard Oils and Greases

are highly efficient, each grade being produced to meet a particular requirement. When the proper Standard Oil or Grease is selected and used on a bearing, the lubrication is as nearly perfect as lubrication can be.

Our lubricating engineers will welcome an opportunity to make a survey of your plant—free of cost, and without placing you under any obligation—and they will recommend the lubricants which will serve you best and reduce friction in your plant to a minimum.

Knowing that it will be to your best interests to avail yourself of this offer, we urge you to write, phone or wire our nearest branch office.

STANDARD OIL COMPANY
(INDIANA)
910 S. Michigan Avenue Chicago, Illinois

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- Saginaw

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- Fargo
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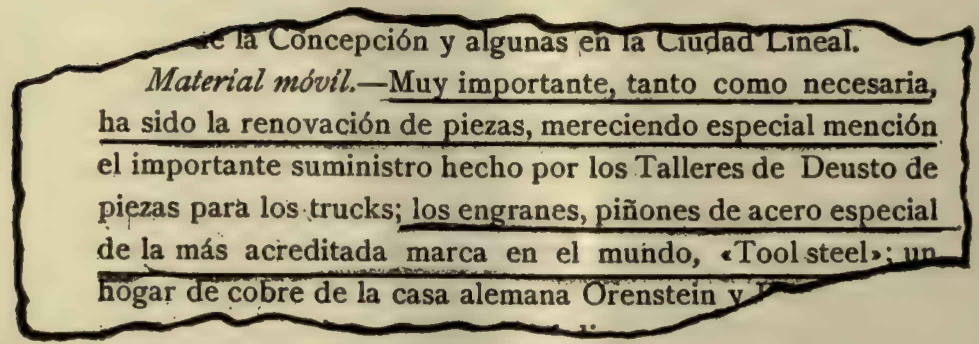
WISCONSIN
- La Crosse
- Milwaukee

MINNESOTA
- Duluth
- Mankato
- Minneapolis

MISSOURI
- Kansas City
- St. Joseph
- St. Louis

SPAIN *Says:*

T. S. Q. means this



la Concepción y algunas en la Ciudad Lineal.

Material móvil.—Muy importante, tanto como necesaria, ha sido la renovación de piezas, mereciendo especial mención el importante suministro hecho por los Talleres de Deusto de piezas para los trucks; los engranes, piñones de acero especial de la más acreditada marca en el mundo, «Tool steel»; un hogar de cobre de la casa alemana Orenstein y

Translation "Very important and necessary has been the purchase of repair parts and we make special reference to the gears and pinions of the most famous make in the world, the "Tool Steel."

A large company in Spain, in its annual report to stockholders, commenting on its financial showing and *good management*, includes the above paragraph.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

Tool Steel Gear and Pinion Co
Cincinnati, Ohio

Full Wear

OF the 200,000 wheels replaced annually under electric rolling stock, very few are necessitated by wear from rolling on the rails.

Chipped and broken flanges, shell outs and slid flats account for many, while the re-turning of multiple wear steel wheels also consumes much wheel metal.

But there is one wheel in which every ounce of tread metal represents wear resistance. This wheel is the Davis—the "One-Wear" Steel Wheel that requires no contour conditioning to develop full life.

The Davis "One-Wear" Wheel is made of special steel compressed by centrifugal action while the metal is molten. It is subjected to scientific heat treatment, resulting in great strength and resistance to wear.

If you are not fully informed concerning Davis "One-Wear" Wheels write us.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
"ONE-WEAR"
STEEL WHEELS

PANTASOTE
TRADE MARK

AGASOTE
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Standard for
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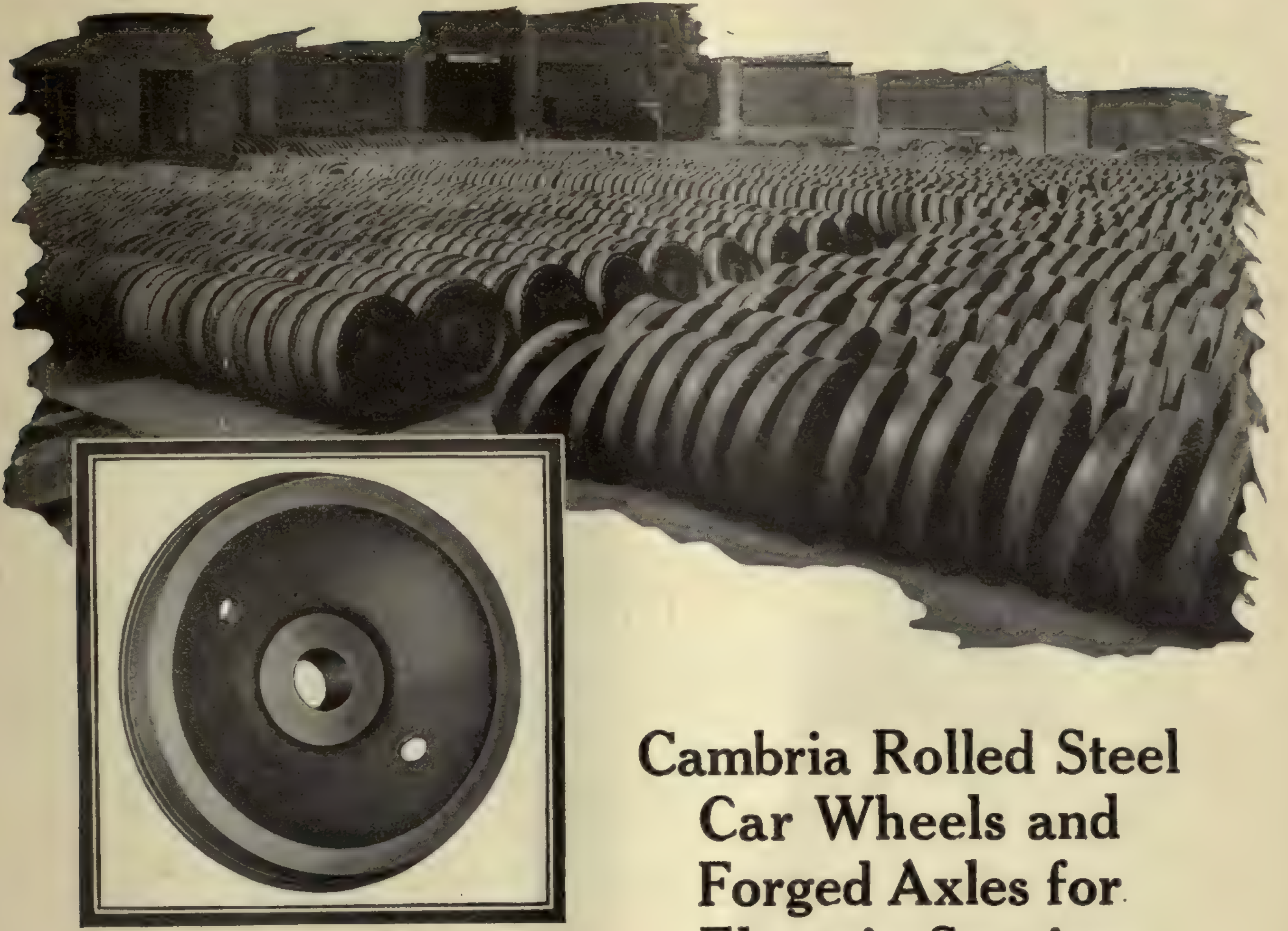

Cambria Rolled Steel Car Wheels and Forged Axles for Electric Service

ROLLED steel wheels for electric railroad service are made in our Cambria Wheel Plant, which is fully equipped for making the highest grade wheels that can be produced.

Our wheels give the maximum of service and satisfaction because the greatest care is used, not only in the manufacture of the wheel, but also in the preparation of the steel that goes in it.

The steel is thoroughly worked and kept at the proper temperature throughout all rolling and forging operations.

Wheels are sized in a solid die, thus eliminating all eccentricity.

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A large quantity of rolled steel wheels are regularly carried in stock to facilitate deliveries. These wheels are of standard sizes and can be bored to meet customer's requirements.

* * *

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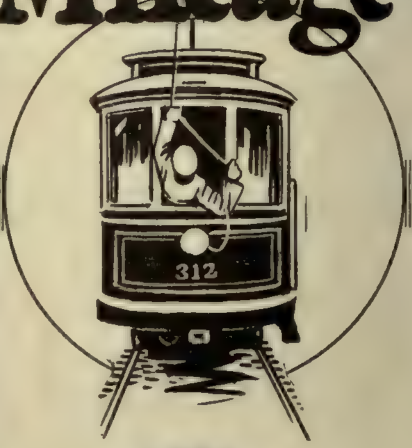

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Their exceptional toughness and anti-frictional qualities insures great strength and slow, even rate of wear.

OBTAINING liberal mileage per dollar of investment is your concern and has been ours for a long time. That is why you are money ahead in the long run of service when you use More-Jones Trolley Wheels, Bearing and Babbitt Metal. You can depend on these quality products, to help you obtain the lowest net cost per mile.

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Arc Welding Handbook

By C. L. HOLSLAG

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This book explains exactly how to handle the electric arc for practically every type of welding job. It explains the equipment, shows how it works, how to handle it and how not to handle it. It describes the process of striking and holding an arc and points out clearly what should be done to get the best results.

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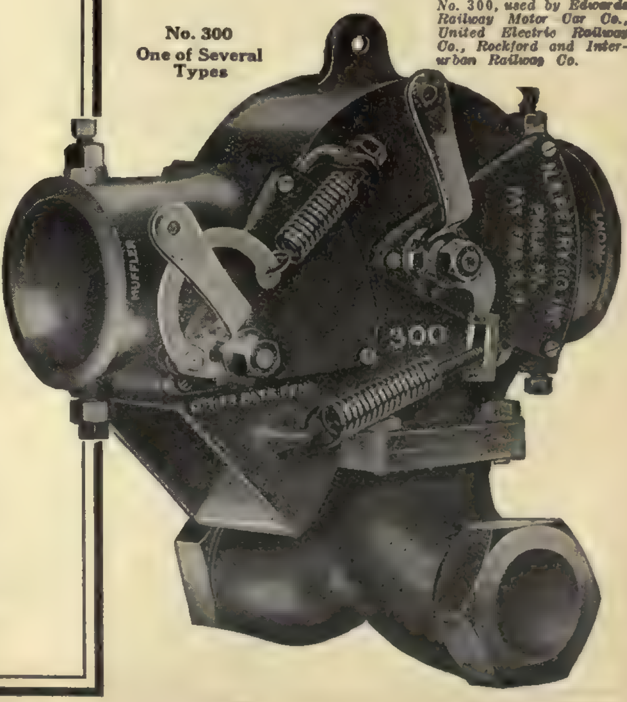

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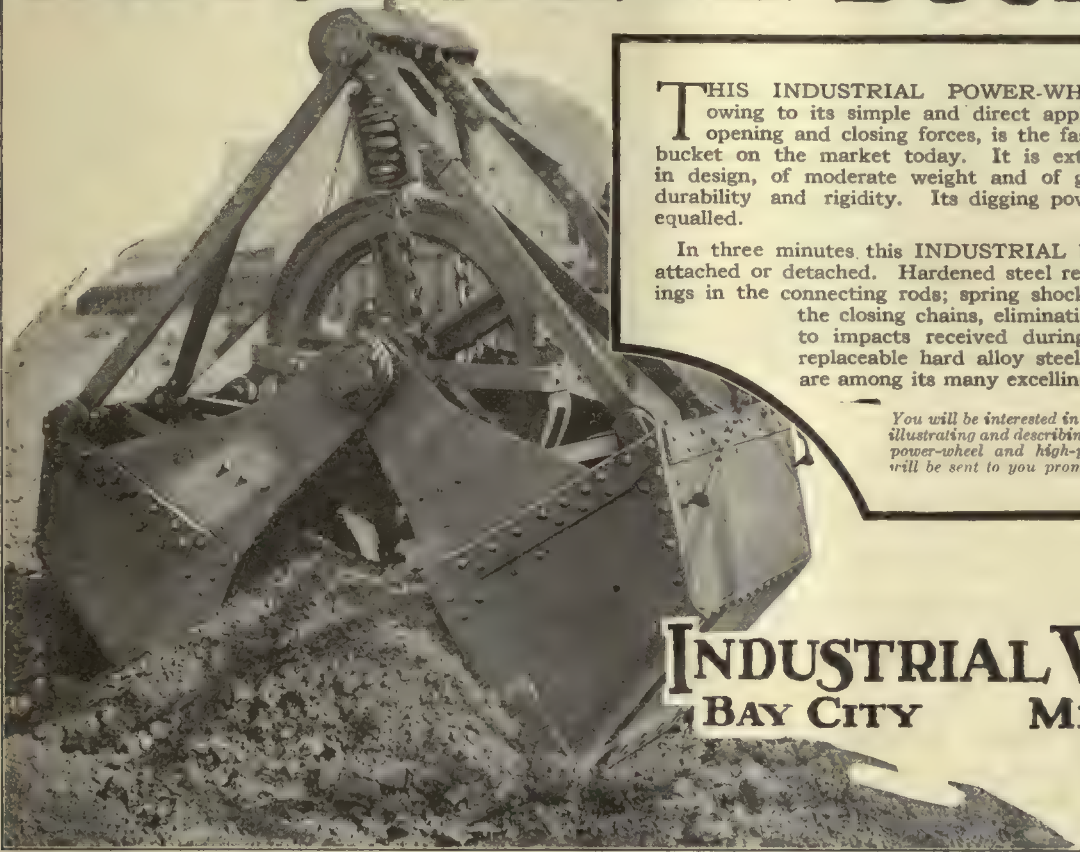

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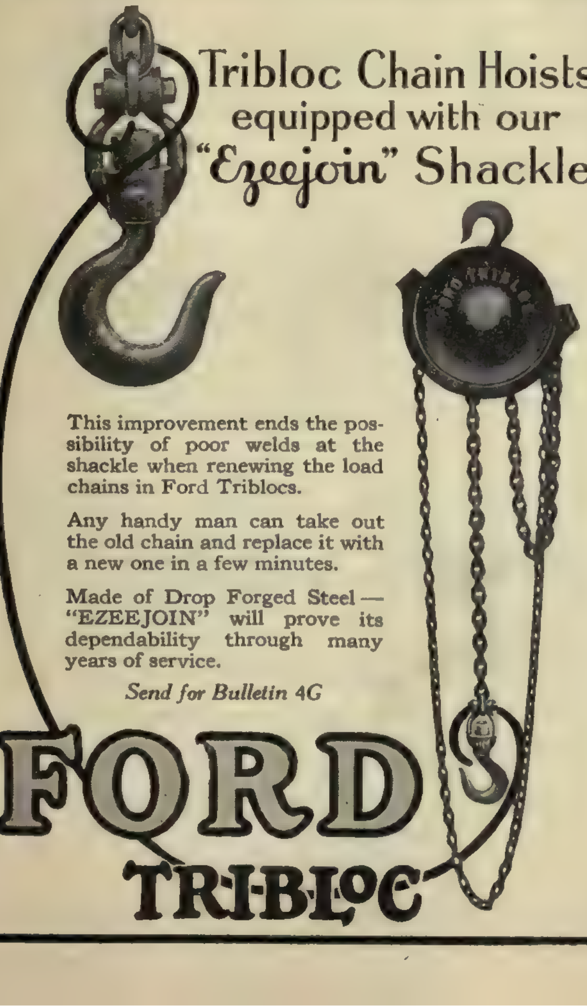

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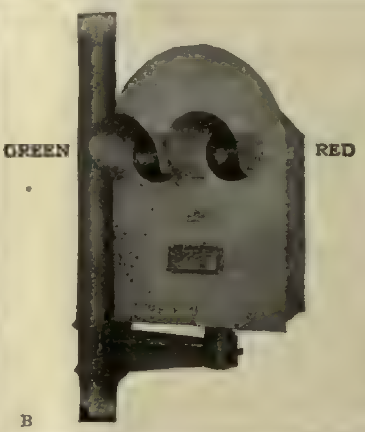

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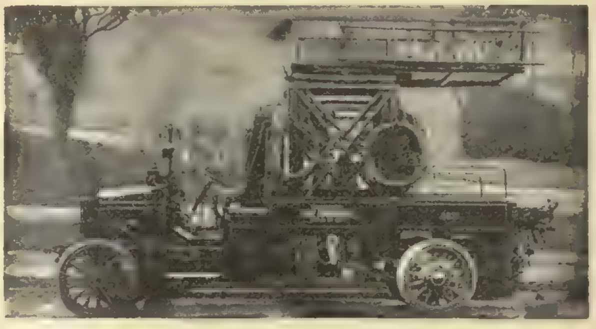

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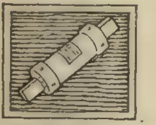

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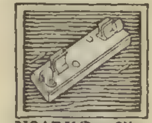

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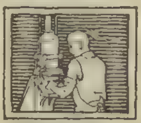

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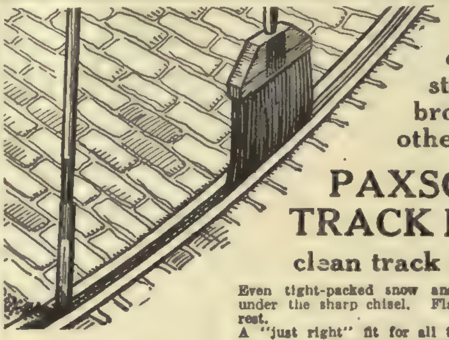

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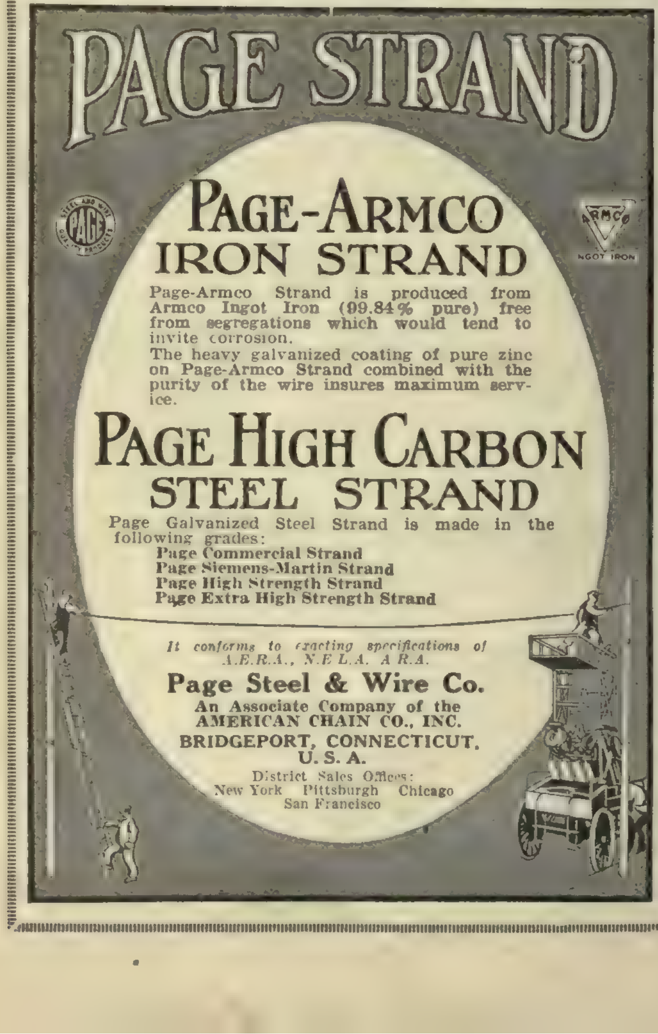

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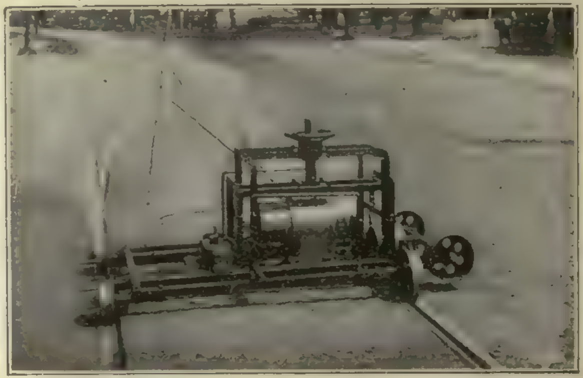

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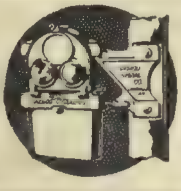

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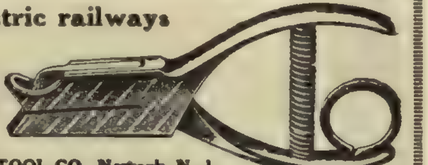

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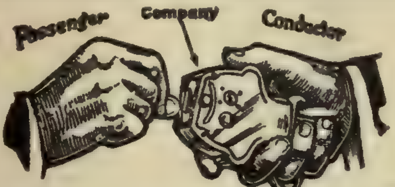

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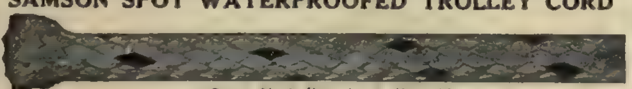

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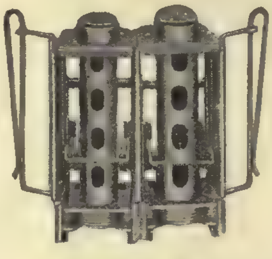

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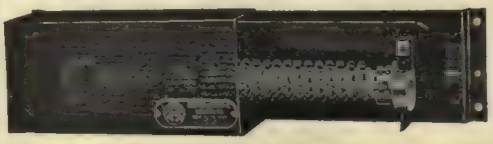

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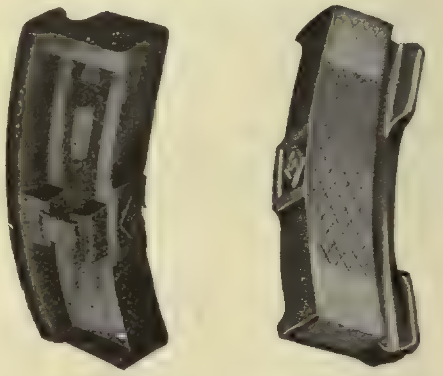

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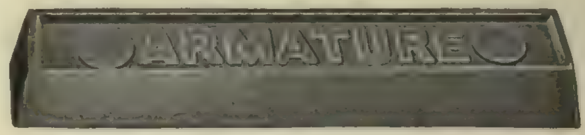

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bearings, especially
in street railway work

The Ajax Metal Company
Established 1880
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roofs, headlinings, interior linings and exterior side panels are being used on the new cars built by Transit Supply Company, St. Paul, Minn., for the Stillwater Branch of the Twin City Rapid Transit Company.

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Length 54-ft. 7¼-in.; width 8-ft. 6-in.
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Kuhlman 25-passenger bodies. Run 15,000 miles. Original tires still operating. Will be painted, lettered and fitted with new tires. Owners lost franchise.

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  - Ingersoll-Rand Co.
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  - Ohio Brass Co.
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  - Ramapo Ajax Corp
- **Automatic Safety Switch Stands**
  - Ramapo Ajax Corp.
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  - Bethlehem Steel Co.
  - Brill Co., The J. G.
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  - Sheldon Axle & Spring Co.
  - St. Louis Car Co.
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  - Associated Spicer Co.
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  - Int. Register Co., The
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  - Bemis Car Truck Co.
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  - More-Jones Brass & Metal Co.
  - St. Louis Car Co.
  - Westinghouse E. & M. Co.
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  - Hubbard & Co.
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  - Brill Co., The J. G.
  - St. Louis Car Co.
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  - Brill Co., The J. G.
  - General Electric Co.
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  - National Brake Co.
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  - Brill Co., The J. G.
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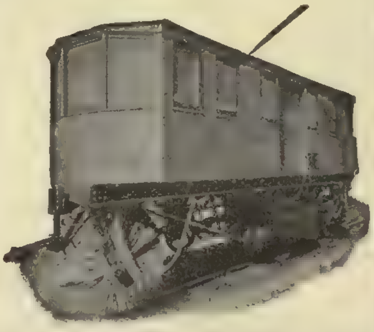

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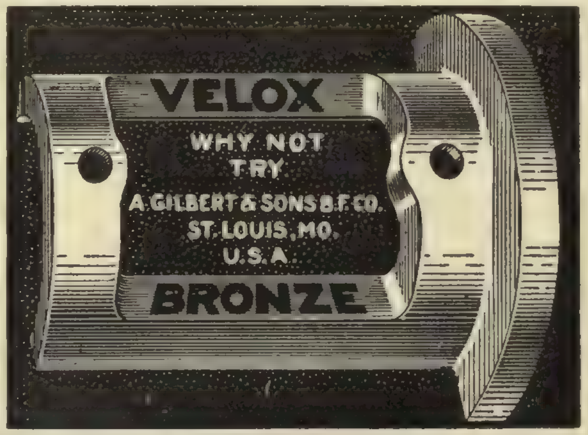

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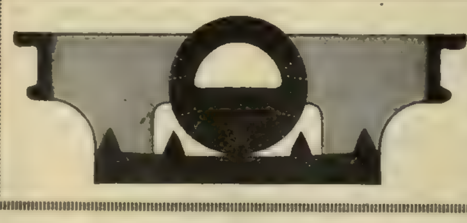

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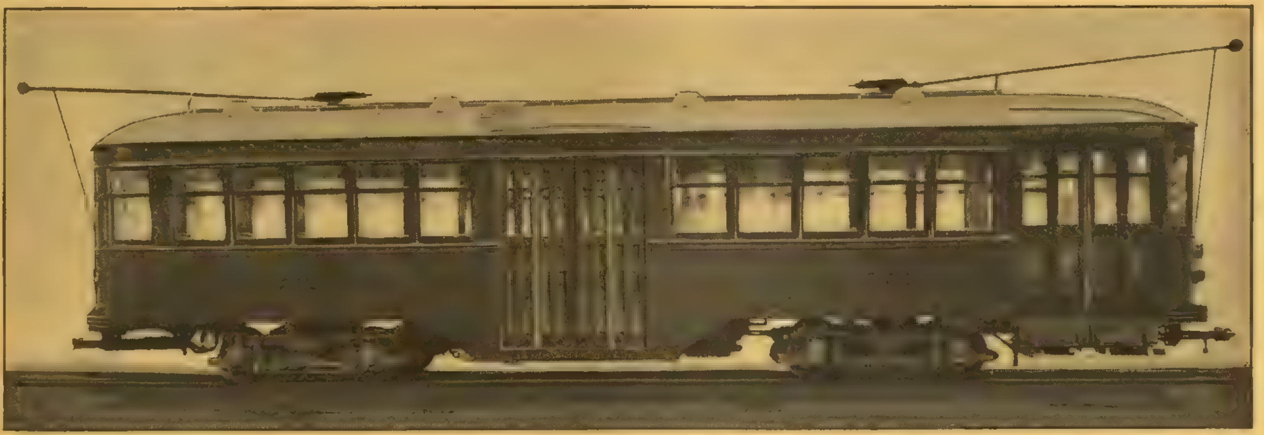

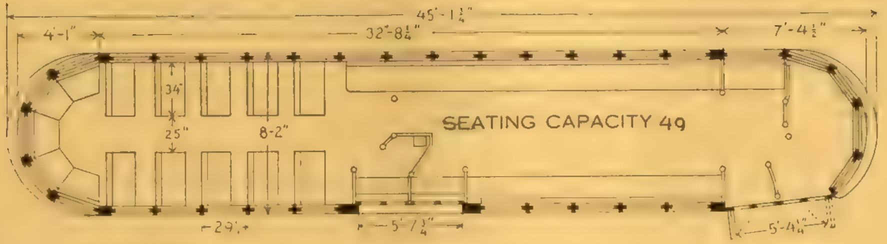

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For further information consult July Issue
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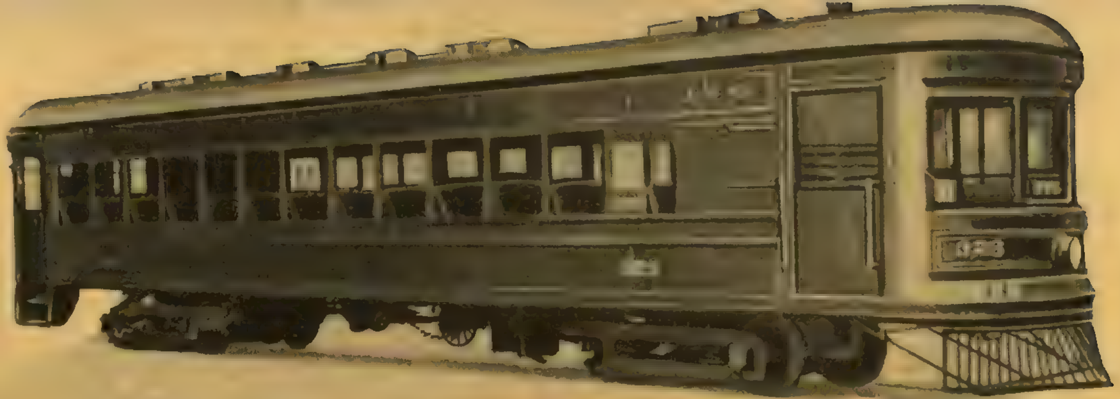

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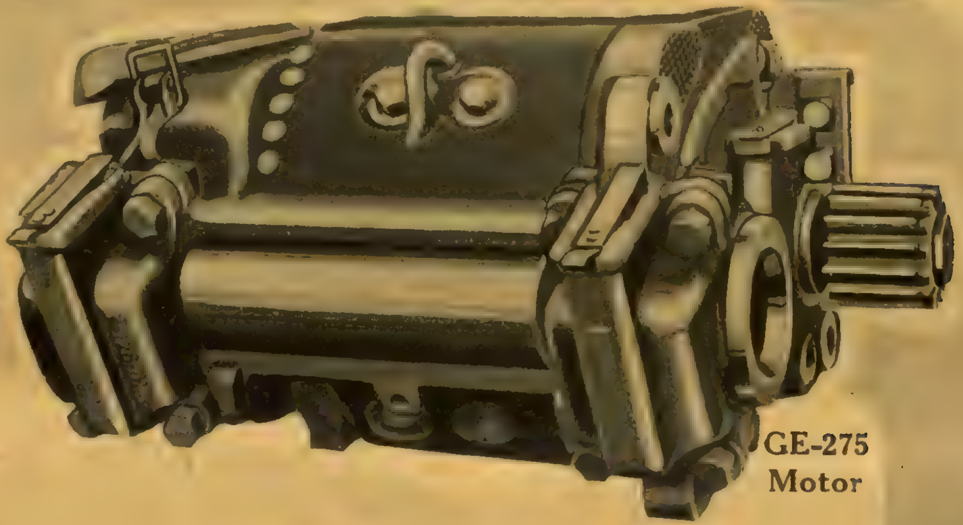

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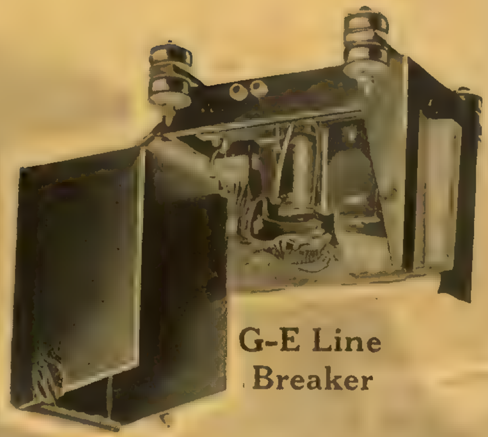
Motor



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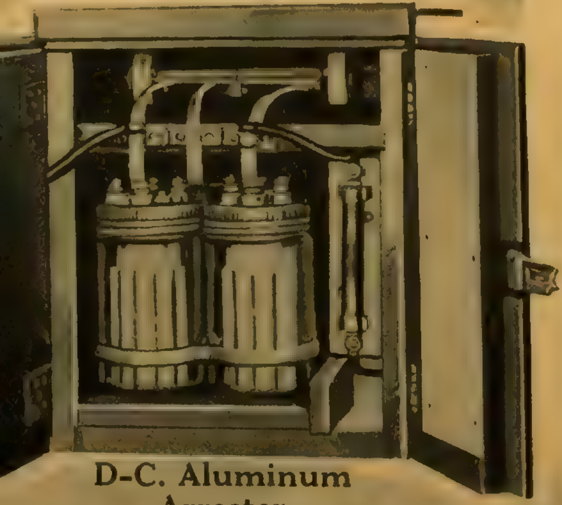

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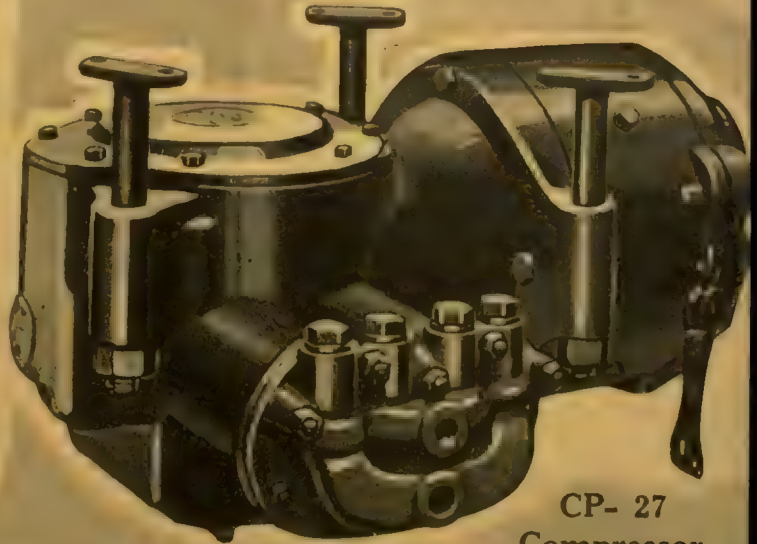

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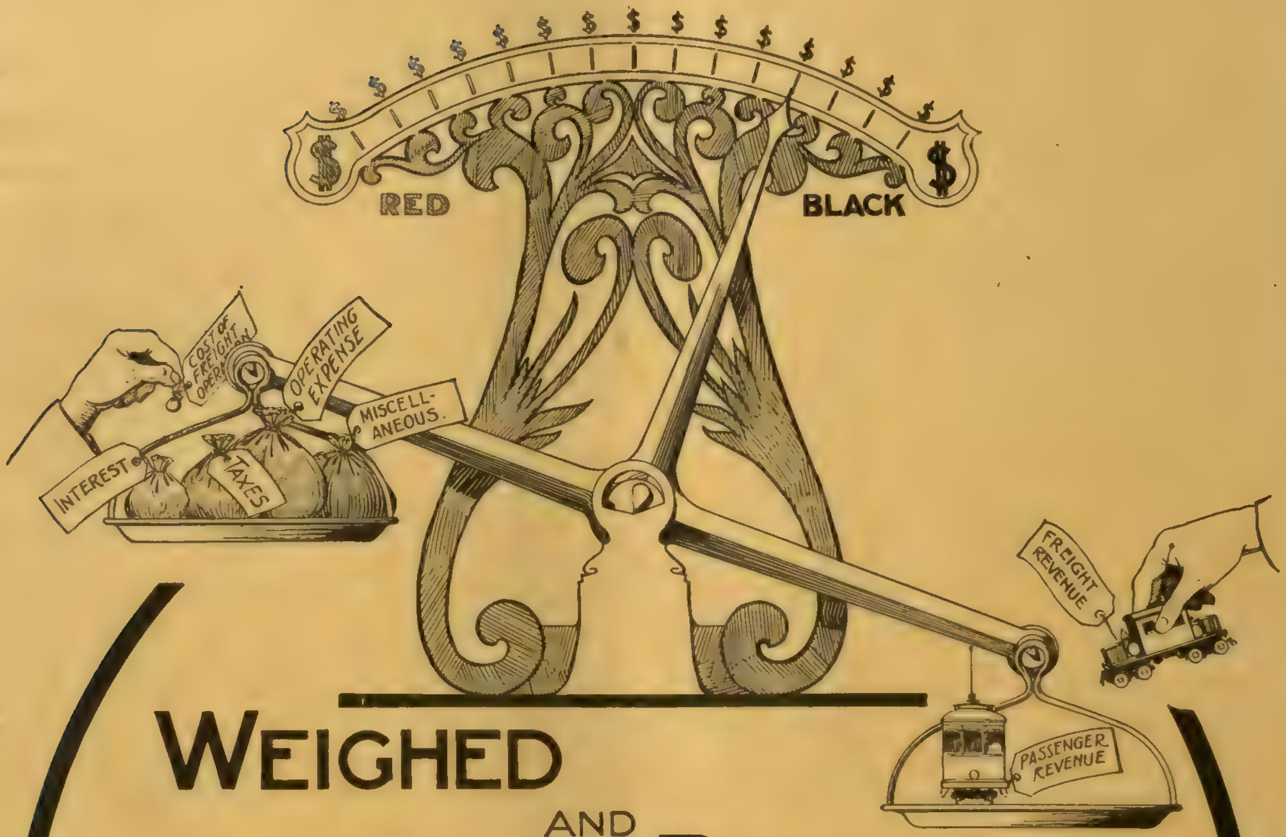

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The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

If You Don't See What You Want—

A SHORT time ago a 20-year subscriber to this paper took the editors to task for their failure to publish articles on five subjects which he considered of great interest. Examination of the back issues of ELECTRIC RAILWAY JOURNAL confirmed the impression of the editors existing at the time this criticism was made, namely that articles on four of the five subjects mentioned had already been printed in the paper. Information was available on the fifth subject but the editors did not consider it of sufficient general interest to the readers to justify publication.

It is not always easy to tell, however, whether a certain article will or will not be of interest to electric railway men. On the one hand it is undesirable to fill the pages of the JOURNAL with a lot of material that has no wide appeal to its readers. Nor is it desirable to leave out anything that they would like to see. Any information that comes directly from them describing the kind of articles they would like to have in the JOURNAL is very helpful. The purpose of this paper is to serve its readers. The JOURNAL has an organization well equipped to collect information concerning electric railways anywhere. So if you don't see what you want—ask for it.

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Mr. Bennett is the speaker:

Mr. G. Bennett, general agent traffic department, Chi., N. S. & Mil. R.R., read a paper on "Getting More Riding" at the C. E. R. A. meeting. In it he voiced this:

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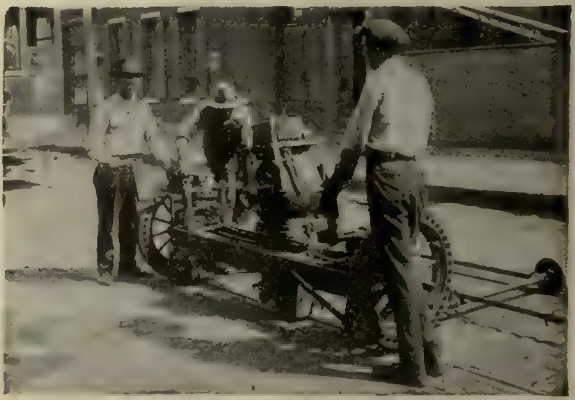
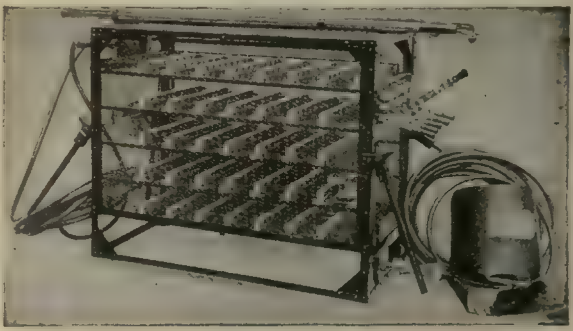


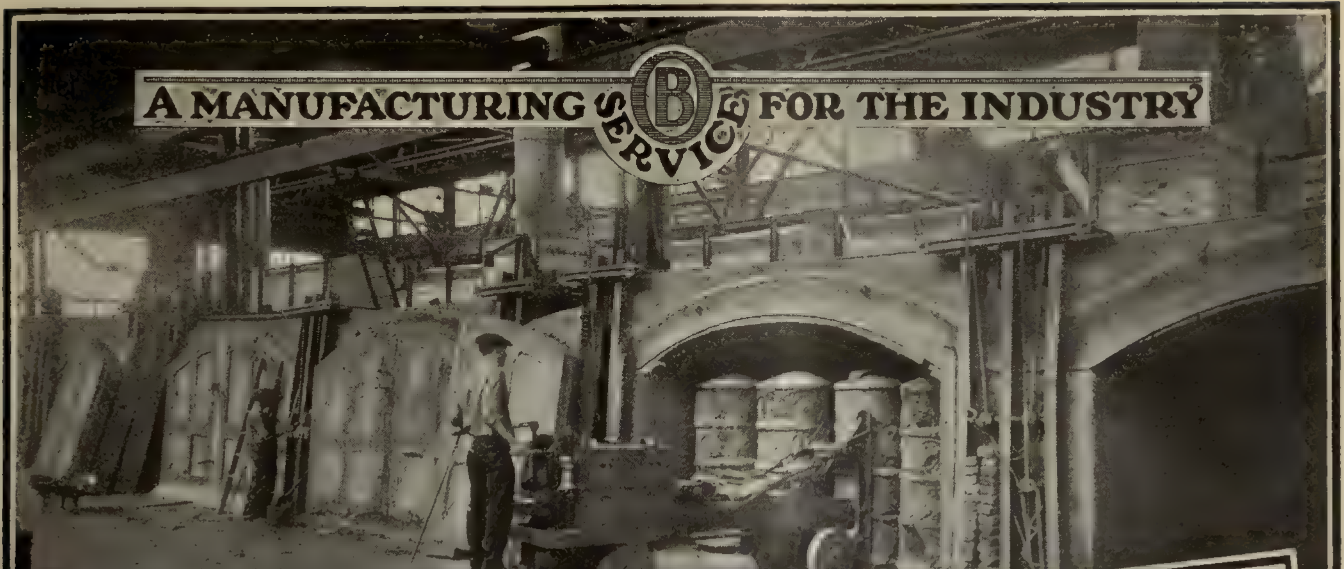
"Universal" Rotary Track Grinder

"Atlas" Rail Grinder

"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



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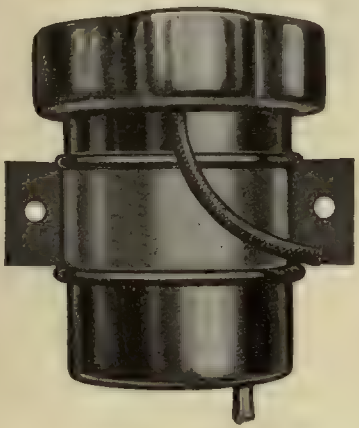
Type IC



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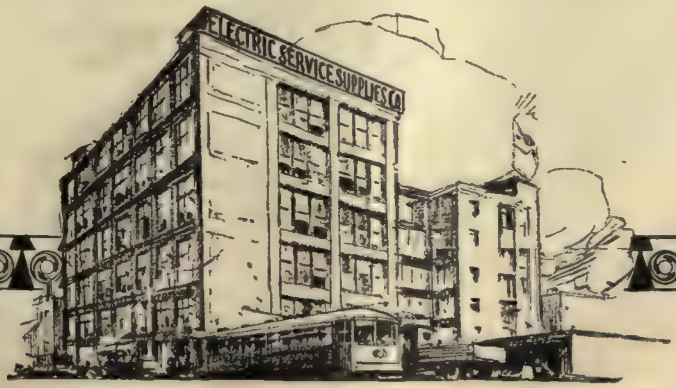

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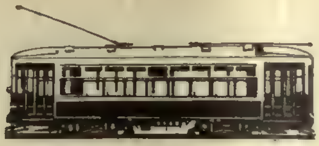

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WHY do more than 80% of all the electric railway companies in America use *National Pneumatic* door equipment?

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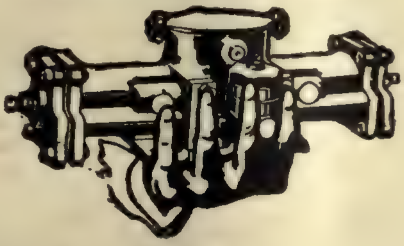

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Chassis: Low, a real bus chassis.

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Passengers *like* to ride in Mack buses. Railways find them economical to operate and maintain. Their strict adherence to schedule wins friends and strengthens the position of the railway in the communities served.

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Mack bus men have collected valuable information on every phase of the bus problem as it applies to railway adoption. This information is in tangible and permanent form. Ask to study it.

MACK TRUCKS, INC.
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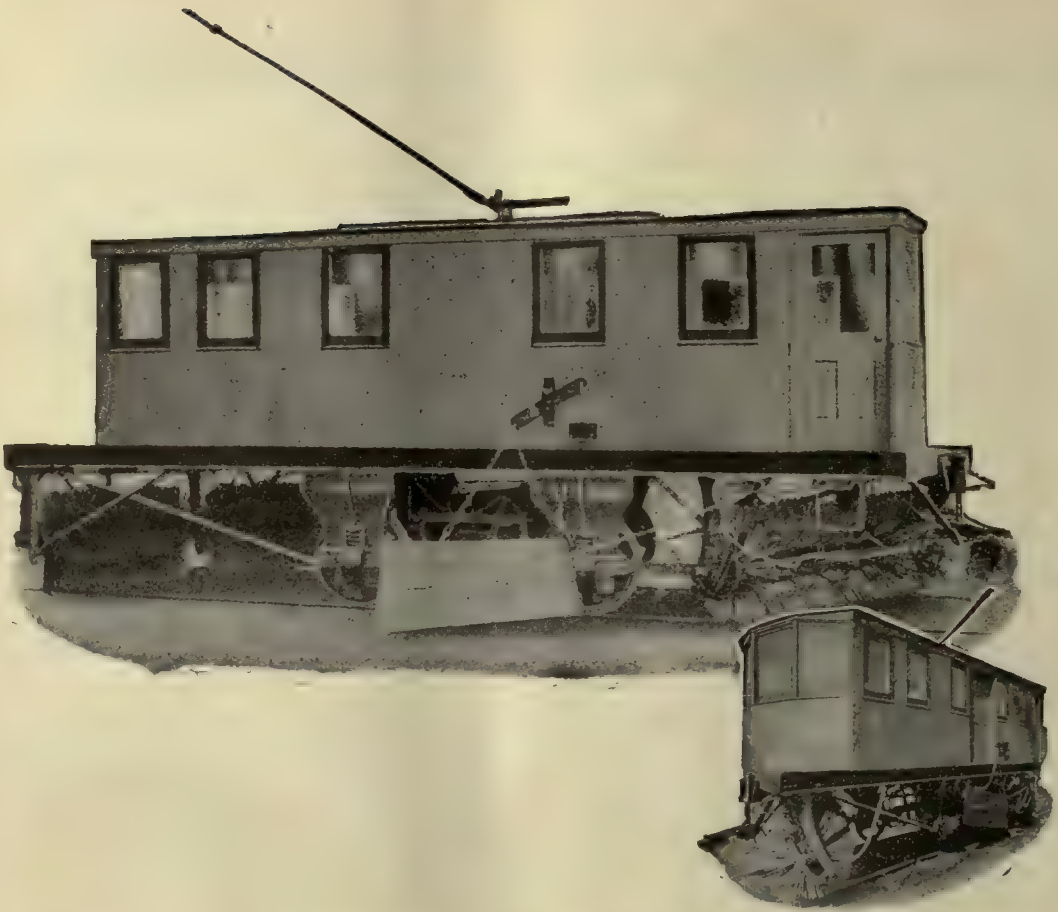
Eighty-three direct Mack factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus

25 Passenger, City Type

67 per cent of Mack bus deliveries this year have been to street railway companies.

Performance counts!



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Over 1400 of the above type long broom sweepers are in use in various parts of the world.

This sweeper is exceptionally strong and rigidly built, with standard single truck and steel underframe. The long boom clears 15 inches additional on the outside of each rail. Brooms have case hardened roller bar steel belt chain with detachable links.

McGuire-Cummings Manufacturing Co.
Builders of Street Cars and Trucks
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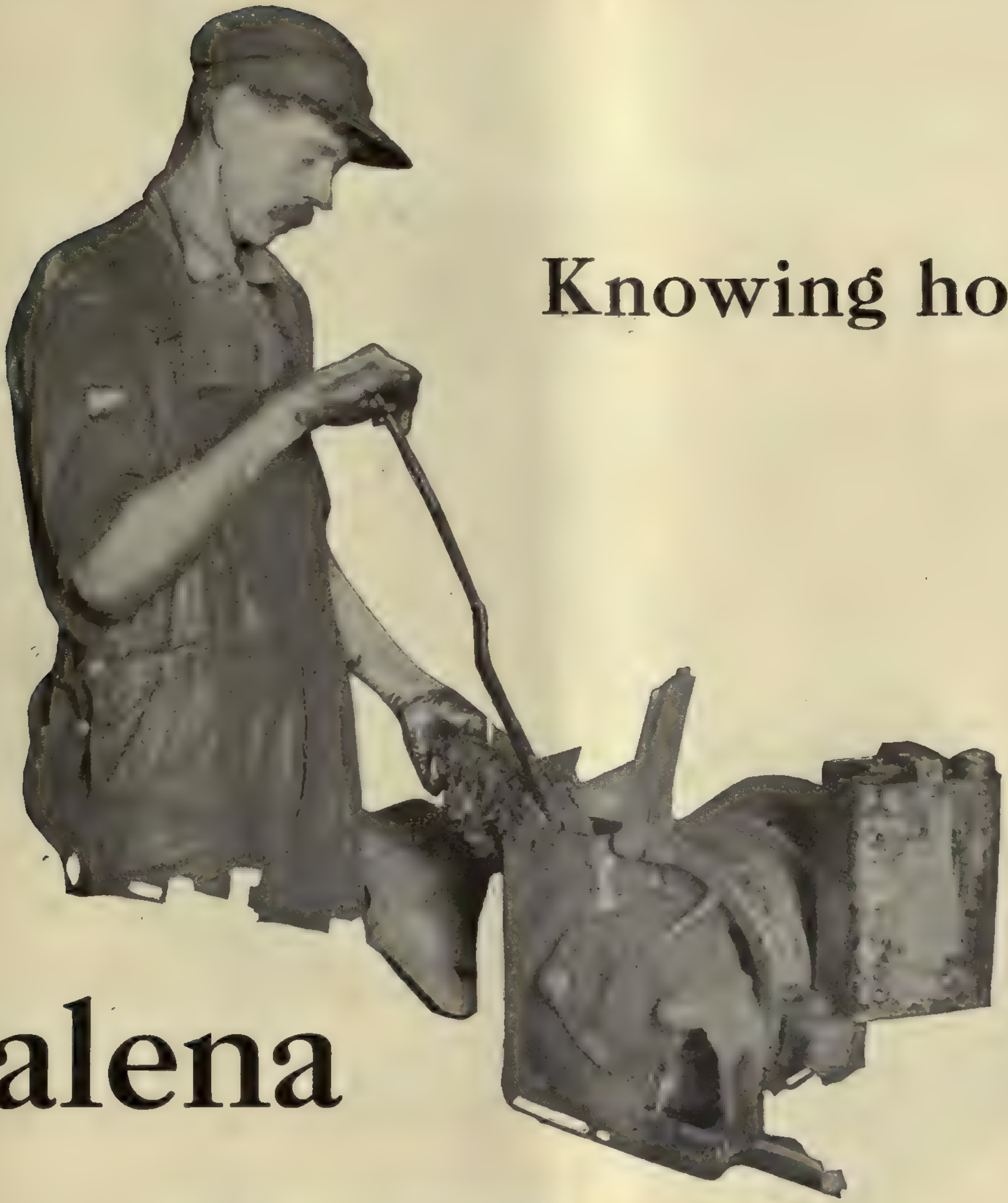

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Our Service Department knows and shows

Experience, which embraces hundreds of railways, large and small! Familiarity with the best practices in car maintenance, power plant operation, and track departments! An organization with facilities for collecting comparative data on mileages and costs from the most efficiently operated roads.

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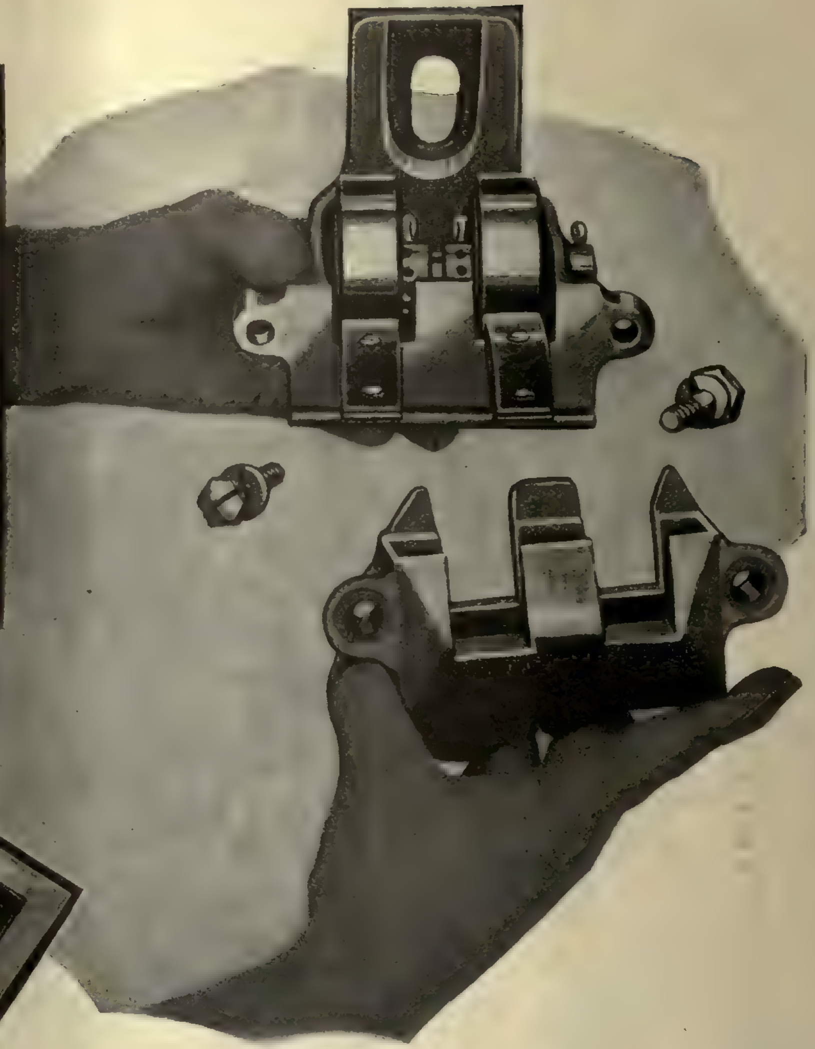

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A Renewable Carbon-way

Do you replace worn brush-holder carbon-ways promptly as you should? Or do you continue operation with the worn part and risk a higher motor maintenance cost?

Many railway motors now in service have worn brush-holders that should be replaced. Replace them now with the new G-E Renewable Carbon-way Holder. Then in the future just the carbon-way, the worn part, can be renewed at about one fifth the cost of replacing a complete holder.

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GENERAL ELECTRIC

New York, August 23, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 64
Number 8

Psycho-Technical Tests for Vehicle Drivers

IN THE decade since the late Professor Münsterberg first proposed to American operators the application of psychological tests to platform candidates there has been a notable advance in the status of psychology itself from a mass of observation and data to that of an exact science. The Münsterberg idea can no longer be classed as chimerical and impracticable. No better proof of this can be offered than the truly classical paper, abstracted in this issue, on "Tests for Motormen and Bus Drivers" which was presented before the June convention of the International Association by L. Bacqueyrisse of the Paris surface lines. Here we have the first extended comparisons of the preliminary judgment of the laboratory and the service judgment of the operator. When psychologist and platform inspector can show 80 to 90 per cent accord, there must be something in a plan that weeds out the unfit before they can cause expense and trouble.

The notable feature of the Paris work, in particular, is the broad co-operation of psychologists and physiologists with the executive staff of the railway, and the recognition that no one or two kinds of tests will suffice for the classification of fit or unfit. Tests involving judgment of speed and distance have made exceptionally good in practice, but there is still a *terra incognita* as regards the behavior of different men under the same emotional stress. The tests for sound and its direction of origin are a long step ahead of the old days. Who does not recall this jest: "Can you hear that clock tick?" "Yes." "Well, your hearing is wonderful. It hasn't run for a week."

In these times when so many employers in other fields have persons of psychological training for employment directors to fit the applicant to the job which best suits his nature, it will not do to say, "Our business is different," when, perhaps, the real reason is that human inertia which keeps us from taking up old things in new ways because of the wrench at deep-rooted prejudices.

Gaudy Colors for Car Painting Are Regaining Their Popularity

THE long familiar policy of economy in car painting seems likely soon to be thrown into the discard. More and more electric railway men appear to be coming around to the point of view that attractively painted cars are a good business proposition. Instead of thinking that "a penny saved is a penny earned" in the matter of car painting they are beginning to realize that a penny judiciously spent on painting may bring in a good return on the investment. An attractive exterior encourages people to ride in a car. Then too, vivid colors that can be seen a long way off have proved helpful in preventing accidents.

For example the luxurious new interurban cars of the Milwaukee Electric Railway & Light Company are painted green below the letterboard and yellow above. Green is used also for the trucks, but the wheels are yellow. What a contrast that presents to the cars so common on many roads a short time ago, painted some dull color all over. Many railways have resumed the use of gold striping to decorate the outside of their cars. Bright green, red and various shades of yellow and orange are now very common. The latter color is widely used to increase visibility. Another company has adopted blue as the color for its cars. Lettering, numbering and striping are done in some attractive contrasting color or in gold or aluminum. Altogether it begins to look as though gaudy colors are regaining their former popularity.

If the Carfare Went from 5 Cents to $130,000,000

WHAT actually had to be done when extremes of inflation occurred was shown in the report of the Elevated and Underground Railway of Berlin for 1923, just at hand. The report shows the average fare per passenger, as measured in marks, for each month during the year. Each month this figure showed a jump ranging from an increase of a modest 5 per cent all the way up to several thousand per cent.

Starting with 49 marks in January, which, by the way, was several hundred times the pre-war fare, the fare in December of last year reached the enormous sum of 130,123,000,000 marks. This increase would correspond in American currency to a rise in the fare from 5 cents to $130,000,000 per passenger.

Of course, an attempt to do business under such conditions must have been more like a nightmare than anything else, but it is only by citing extremes that the force of the necessity for an increased railway fare with currency inflation can be made evident to some people. It is hoped that the time never will come when American electric railway companies will have to charge $130,000,000 for a car ride. But even though they fail to follow the German electric railways to that extent, the companies should be permitted to charge fares that are commensurate with the existing inflation of the currency.

There is, however, a philosophy in this country which admits of no justice in a street railway fare higher than that mentioned in the franchise of the company. People who hold this doctrine cannot see any need for higher fares, regardless of increase in length of ride or decrease in the purchasing power of money. It sometimes makes one wonder if, with a degree of inflation such as that which existed in Germany last year, Mayor Hylan would still have claimed that 5 cents is a reasonable figure for a subway ride. Perhaps the recital of the German experience would do more to convince men of this type than any attempt to show a real justification from reams of statistics.

The Best Form of Public Ownership in Sight

WITHIN the space of a few months, since the reorganization of the elevated lines in Chicago, the financial condition of the company has been improved to such an extent that in the five weeks of the customer and employee ownership campaign more than half of the $5,000,000 issue of preferred stock has been sold. Thus wide local ownership of the securities is being obtained as one of the first steps toward the fulfillment of the company's promises of adequate rapid transit service. In other words, the company by its active promotion of the plan, which has come to be nationally known as "Customer and Employee Ownership of Public Utilities," is actually carrying out democratization of ownership of the industry and the substitution of public ownership of the best kind for possible political ownership. There can be no quarrel with the desire of the company to accomplish these purposes except possibly from political interests, the selfish desires of which might be hurt by the process. In any event the company will secure and retain popular favor only as it deserves it. It cannot well be otherwise.

A thoughtful provision of the present issue contemplates the payment of dividends monthly. Thus the company will be in a position to keep the actual owners of the property almost constantly informed in a most direct way of the progress that the company is making. The necessary consolidations, connections and extensions of the lines can be brought about, the desirable improvements in service can be obtained, and the fare can be made moderate and reasonable, at least, on the rapid transit systems of the city, if the company receives support in the stock sale and the necessary franchises are forthcoming. In the work of securing these things the company appears to have made a good start. After all, to both the owners of the property and the public—and these give promise of being synonymous in Chicago—it is the end that matters, not so much the means.

How Old Is Ann's Brother?

THE theory that sons never grow up has always been a cherished feeling of motherhood and at the same time an elusive hobgoblin for the railway managements to combat. The boy who is six years old at home, five years old at school and four in the street car may be considered as a paradoxical fact. Though he may have come in for a lot of hero worship, ofttimes he is the cause of altercation and humiliation and even in some instances of financial loss.

Superficially, it sounds humorous for a traction concern to sue for 14 cents and it becomes ludicrous when a counter suit is filed for $10,000. But that appears to be the high-class comedy being enacted in one of our oldest and most aristocratic cities, the principals in the cast being the street car company and one of its patrons. The patron contended that her son was four years old and therefore exempt from payment of fare. The company claimed that the boy in question was six years old, and according to law was not entitled to ride free. And so the young man entered upon his first dangerous age. The mother, humiliated and disgraced, she claims, by an uncivil conductor, sought $10,000 damages and the company with boundless faith in the innocent's "erstwhile" four years refused to be out of pocket 14 cents as his transportation fee.

It is conjectural only to assign the contenders to the side of justice but certainly at first reading the whole affair sounds like much ado about nothing. Yet the incident is reminiscent of the day not entirely gone when one frequently heard, "It's only the car company; skin them if you can for they're rich enough." It was no unusual procedure for a person, otherwise just, to "beat the company" if possible though he'd rank first in criticising the niggardly church contributor or the petty political pilferer.

If the company in this case has erred in its judgment then it must suffer the consequences, however grave, of accusation wrongly directed. If, on the other hand, the management has its facts correct the court should establish a precedent which will point the way toward a better solution of the age of Ann and her kid brothers.

The Public Wants Service at All Hours of the Day

SOME electric railways have a policy of giving particular attention to providing good service during the rush hours, and then letting the remainder of the day take care of itself. Others, while attempting to give service in the non-rush, get the schedules so badly distorted in the rush periods that they take the greater part of the following non-rush to get the kinks untangled and the cars back on their correct time. Neither of these methods gives the best service to the riding public that can be provided.

It is true that a great portion of the revenue is obtained in the rush hours, so that it is important to have the service good enough to attract riders at that time. Unfortunately, the service is given at the greatest cost during the rush, as this paper has frequently pointed out. The less intense service of the non-rush provides the backbone of the schedule which is expanded to handle the peak loads. The greater the number of all-day cars, the less the proportionate strain on the system, particularly to provide the additional men.

These reasons point to the need for building up a good riding habit in the off-peak hours. To do this the service must be of the best, for here is where the competition of the automobile, the taxicab, and pedestrianism is keenest. With service less frequent than in the rush, a delay may be more serious to the patron. If he allows what he feels is plenty of time to catch a train, or to make an appointment, or to reach the theater in time for the performance, he is not likely to be tolerant when the car is late. Even though it be a trip to the store, the shopper prefers to spend the time looking at bargains to waiting on a corner or sitting in a stalled street car. A few such occurrences and a rider is lost.

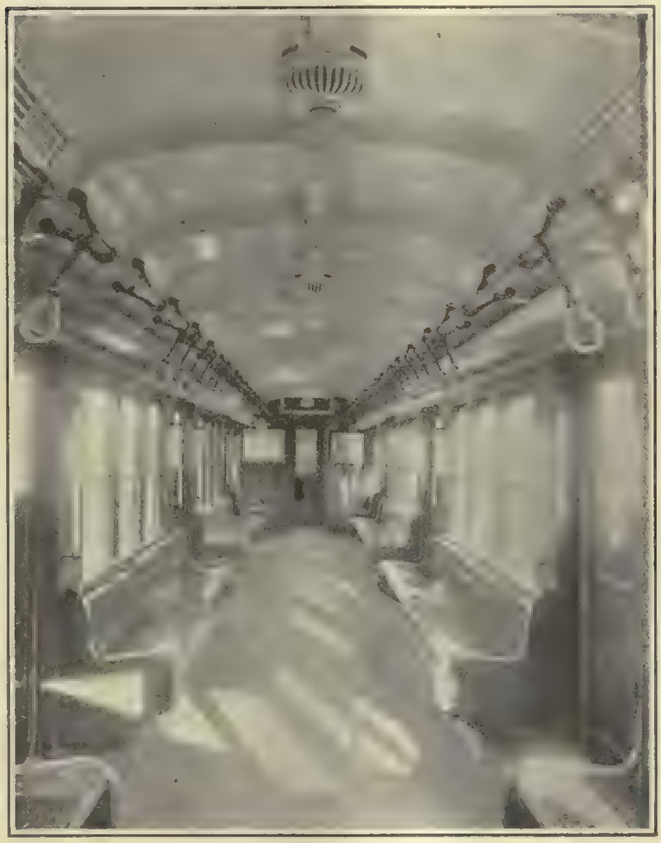
This tends to emphasize the necessity for keeping the transportation force on its toes at all times, so that during the period when there is the greatest opportunity for building up good will and increasing revenue, the service will not be found wanting. In the final analysis it is the service that will sell the rides.

Reducing Weight of Rapid Transit Cars Saves $108,000 a Year

Steps by Which Weight Was Reduced, Carrying Capacity Increased and Strength Maintained in New Rolling Stock for East Boston Service—Electric Door Openers Give Good Results

By John Lindall
Superintendent Rolling Stock and Shops, Boston Elevated Railway

STYLES of cars change and it sometimes seems that these changes are as frequent as the changes in the styles of clothing. For instance, when the famous "hobble" skirt was in vogue, the steps of many of our cars had to be changed to meet the conditions. If it should happen that the "hoop" skirt should again come into style, we should probably have to change the cars to meet that condition! Some people seem to have the idea that when a new type of car is desired, the whole matter is conceived and developed in the brain of the car designer the same as an artist paints a picture. This is not true. There are many requirements which must be met in the design to enable the car best to meet the conditions of service. This may be more fully explained by following out, step by step, the development of our latest type, the East Boston Tunnel rapid-transit car, which has several features quite novel and somewhat radical in design.


The East Boston Tunnel Car, While Narrower Outside than the Standard Elevated Car, Has More Room Inside

SPECIAL CONDITIONS HAD TO BE MET

The East Boston Tunnel was built in 1900 to 1904 for the operation of surface cars run singly. It is probable that at the time when it was designed very little, if any, consideration was given to the question of train operation in the future. The tunnel was put into operation on Dec. 30, 1904, and operated with closed double truck cars with 26-ft. 6-in. bodies. As the traffic increased these cars were replaced with the largest type of car that could be used in the tunnel and on the streets. The increase in carrying capacity obtained in this way took care of the traffic growth up to 1917, when it was found that the capacity of the tunnel with single-car operation had been reached. As a means of further increasing its capacity, the operation of surface car trains was started. The number of cars in a train was gradually increased up to four. While this added materially to the carrying capacity of the tracks, it became evident that the capacity for handling passengers on the station platform also had been reached.

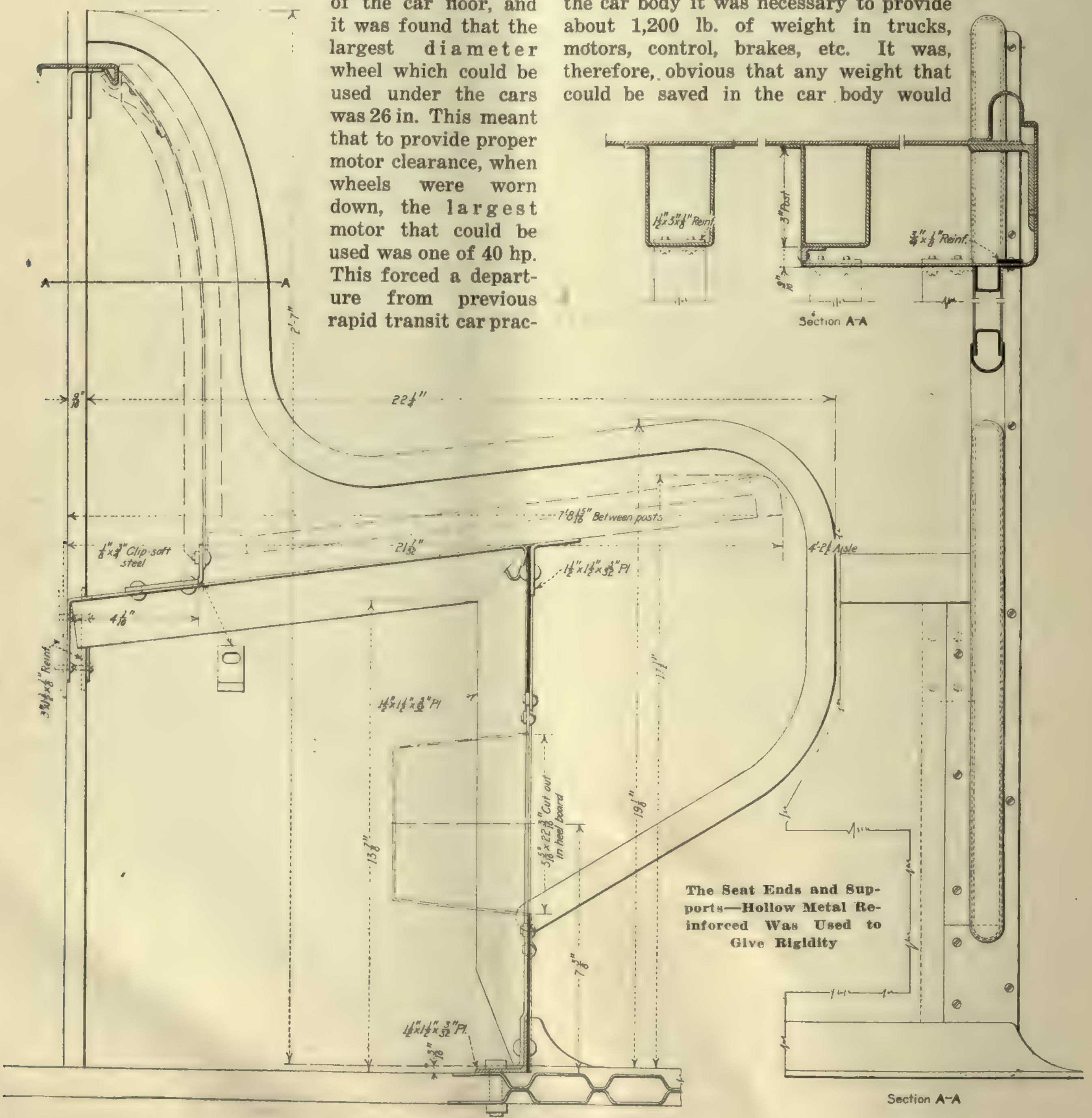
As several car lines were operated through the tunnel with diverse routing after leaving the East Boston end, it was impossible for each car or train to empty the station platforms, as passengers had to wait for the car or train running on their particular routes. This caused serious station-platform congestion.

To relieve this condition and as a means of providing further increase in carrying capacity, it was decided to go to trunk-line service in the tunnel, extend the platforms for six-car trains and provide terminal facilities at Maverick Square, East Boston, for looping the tunnel trains and also the connecting surface cars, with large platforms arranged so that the transfer of passengers could be made at one level.

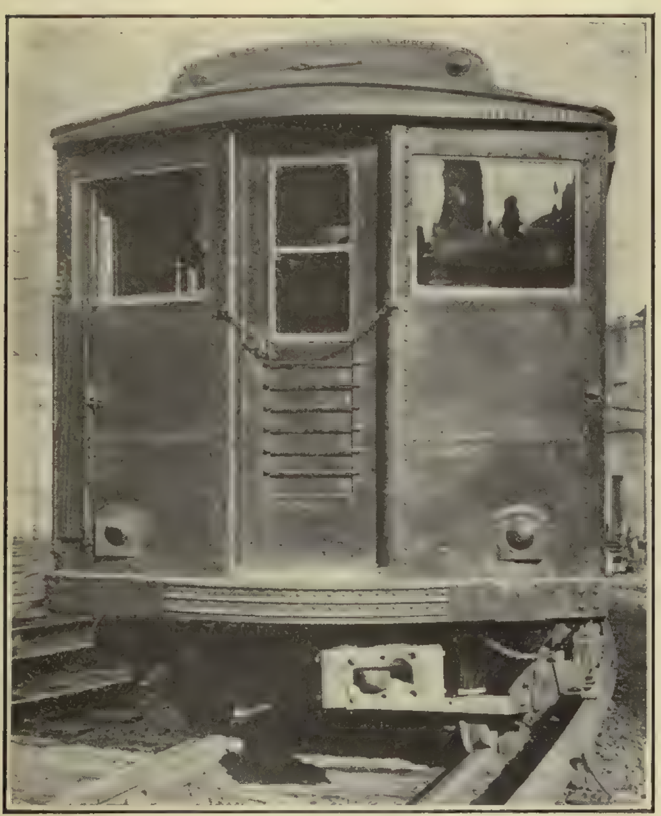
In operating with this arrangement the use of center-entrance motor-car trains was first considered, but this did not prove advisable for several reasons. The design and construction of the center-entrance cars were not suitable to withstand the buffing and pulling stresses which they might be subjected to when operated in six-car trains; overhead trolley operation had never been very satisfactory in the tunnel and with six trolleys on a train, more trouble was to be expected. It was also evident that the center-entrance cars would require more time at stations during heavy traffic than would a car of the rapid-transit type with three doors on a side. There was a further advantage in the rapid-transit type of car, in the reduction of trainmen required for operation, seven men being needed for a six-car train of center-entrance cars and only four for a train of the same number of cars of the rapid transit type. For these reasons, it was decided to use the rapid-transit type of car.

This question having been decided, the logical thing to do, if possible, would be to use the Cambridge subway type of car which had proved so satisfactory in that service; but when the matter of providing clearance for such a large car was looked into, it was found that the cost would be prohibitive. The next question was to determine how large a car could be operated through the tunnel without necessitating material changes in its construction. From tunnel clearance plans it was found that a car of approximately the length and width of the present elevated lines car could be used if its height could be reduced, and it was further found that on account of the low roof of the tunnel over the station platforms these platforms could only be raised to a certain height. This height determined the height of the car floor, and it was found that the largest diameter wheel which could be used under the cars was 26 in. This meant that to provide proper motor clearance, when wheels were worn down, the largest motor that could be used was one of 40 hp. This forced a departure from previous rapid transit car practice of using two motors per car, as sufficient power could not be obtained from two 40-hp. motors. As a matter of fact, it was a very serious question whether a rapid-transit type of car could be built light enough so that the total load would not exceed the capacity of the four 40-hp. motors, considering the number of stops per mile, grades, etc. We were operating the center-entrance cars of approximately 22 tons weight in that service with four 40-hp. motors. A check indicated that we could not safely go much beyond that weight. So our problem was to produce a fireproof rapid-transit type of car with stronger framing, M.C.B. wheels and heavier trucks, without exceeding the weight of the center-entrance motor car. When we considered that the last elevated cars built by this company weighed approximately 35 tons, the solution seemed quite impossible.

A comparison of the weights of the various parts of cars indicated that for every 1,000 lb. of weight in the car body it was necessary to provide about 1,200 lb. of weight in trucks, motors, control, brakes, etc. It was, therefore, obvious that any weight that could be saved in the car body would



The Seat Ends and Supports—Hollow Metal Reinforced Was Used to Give Rigidity



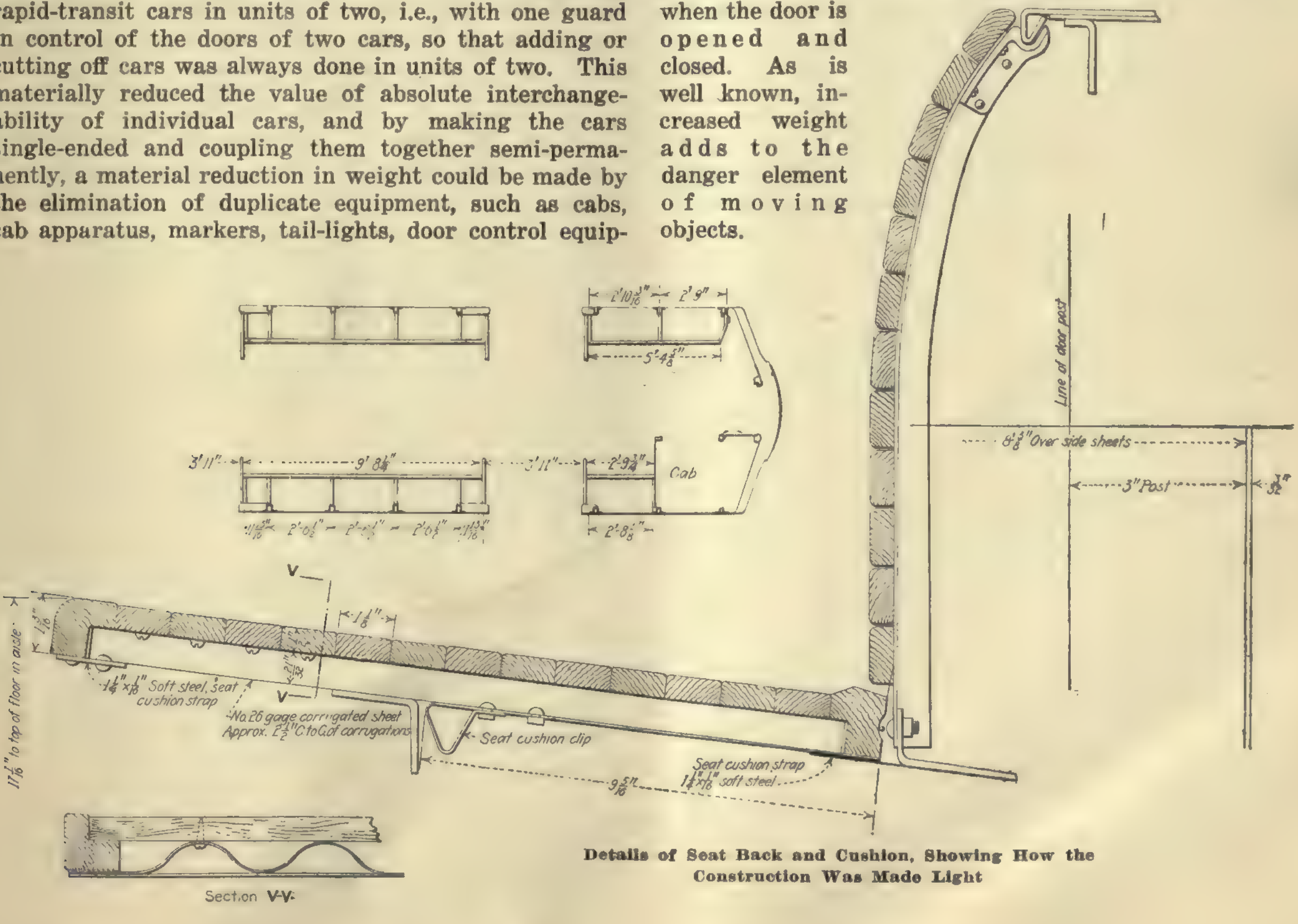
End of a Two-Car Unit. The Inside Ends Have Semi-Permanent Coupling

more than double itself in the total weight saving. With this in mind, we began consideration of means for reducing car-body weight without sacrificing necessary strength. We had developed the practice of operating rapid-transit cars in units of two, i.e., with one guard in control of the doors of two cars, so that adding or cutting off cars was always done in units of two. This materially reduced the value of absolute interchangeability of individual cars, and by making the cars single-ended and coupling them together semi-permanently, a material reduction in weight could be made by the elimination of duplicate equipment, such as cabs, cab apparatus, markers, tail-lights, door control equipment, etc. This amounted to approximately 1,300 lb. per car.

DOORS ON THE OUTSIDE OF CAR REDUCED WEIGHT

It had been universal practice to slide the doors, in both the sides and ends of the car, into pockets in the walls. This meant double walls, glass, etc., at all such pockets—eight per car. These pockets also determine the thickness of the car walls. By placing the side doors on the outside of the car and designing the end doors to swing, we eliminated the necessity for door pockets and were able to reduce the thickness of the walls of the car. This permitted placing the seats nearer the outside line of the car and gave the further advantage of greater passenger carrying capacity. In fact, the distance over side walls of the East Boston tunnel car is less than that of the elevated car, while the aisle space is greater; or in other words, it is a smaller car outside and a larger car inside. This change permitted a saving in weight of approximately 1,500 lb.

The matter of providing suitable fireproof doors on rapid-transit cars has been a serious problem. Sheet steel was generally adopted for this construction, but a number of difficulties developed from its use. The light-gage sheet steel at first used cracked at the corners. There was trouble from condensation of moisture in the interior of the door, and also water would get into the door at the glass rabbet. For these reasons heavier metal was substituted, and in some cases cast aluminum doors were used. Notwithstanding this, the weight and cost of the doors increased. Weight in car doors is doubly expensive. It costs money to carry it on the car and costs additional money on account of having to move that weight twice at each station stop when the door is opened and closed. As is well known, increased weight adds to the danger element of moving objects.



Details of Seat Back and Cushion, Showing How the Construction Was Made Light

As a remedy and a means of reducing weight, we decided to go back to the wooden door and provide fireproofing by covering the wood with thin sheet-metal. The Fire Underwriters consider a wooden firedoor covered with tin of no greater firehazard in a building than one made of sheet steel. We arranged to seal the sheet metal covering to prevent moisture from getting to the wood, and we interlocked the sheet-metal covering so that in the event of the doors being subjected to temperatures sufficiently high to melt the seal, the sheets could not be displaced. With such doors, we were able to make a reduction of 800 lb. in weight.

FIREPROOF FLOORS OF LIGHT WEIGHT ADOPTED

The necessity of providing fireproof floors in cars was the cause of a material increase in weight. The method adopted was to lay sheet-steel flooring, pressed in the form of corrugations to give some vertical stiffness over the underframe, and cover this with a cement composition, the combination resulting in a stiff and rigid floor. This met the fireproof requirements and carried the load satisfactorily. Due to the vibrations set up in the floor, the composition material cracked and became loose. To prevent this, floors were laid with thicker composition, which meant additional weight, and there was the further objection that the floors were cold in winter. Our attention was called to a floor that had been invented by a New York engineer, which was called "Truss-plate" flooring. On investigation we found that two cars having this flooring had been in service several years with apparently satisfactory results. By the use of this material in our East Boston Tunnel cars, we were able to save approximately 2,000 lb. in weight, and the floor, being constructed with a dead air space between the upper and lower plates, seemed to be an effective temperature insulator, making the floor warmer during the cold months. The strength of the floor is entirely in the plates and a thin, flexible composition is used for the wearing surface.

REDUCING WEIGHT OF THE SEATS

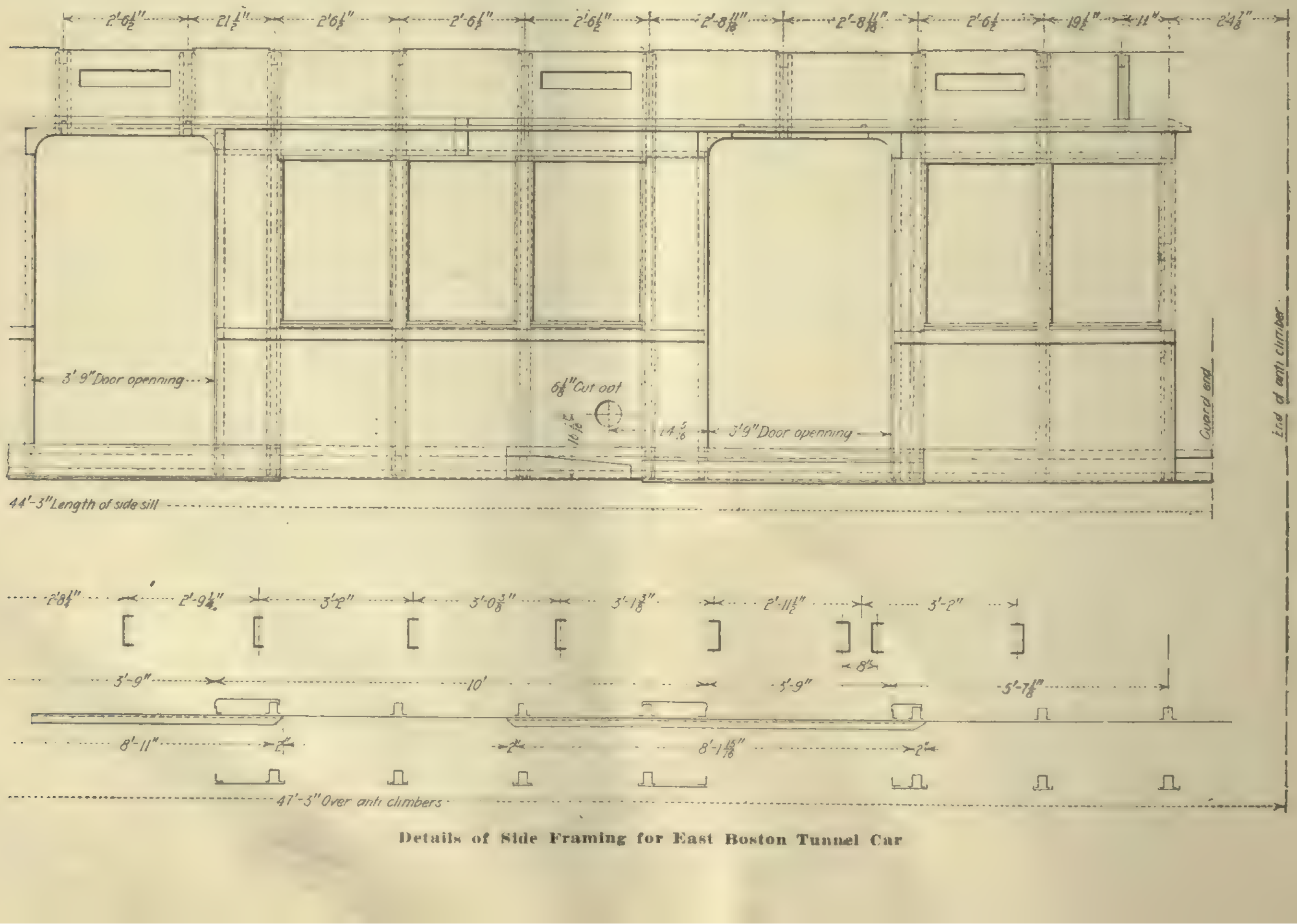
The wooden slat seats in the rapid-transit cars were designed with the necessary strength entirely in the wood; to meet the Underwriters' requirements for fireproofing over heaters and electrical apparatus, the undersides of seat-frames were covered with sheet metal. By redesigning the seat and using the sheet metal in a corrugated form we were able to make the metal furnish the necessary strength and stiffness as well as provide the necessary fireproofing. This change enabled a saving to be made in seat weights of 160 lb. per car.

The total of the items of weight saved thus far mentioned amount to 4,460 lb. in car-body weight. As previously pointed out, weight saved in the body would more than double in the total weight saved. This meant a total saving of approximately 5 tons. Having accomplished so much, it began to look as though the problem might possibly be solved.

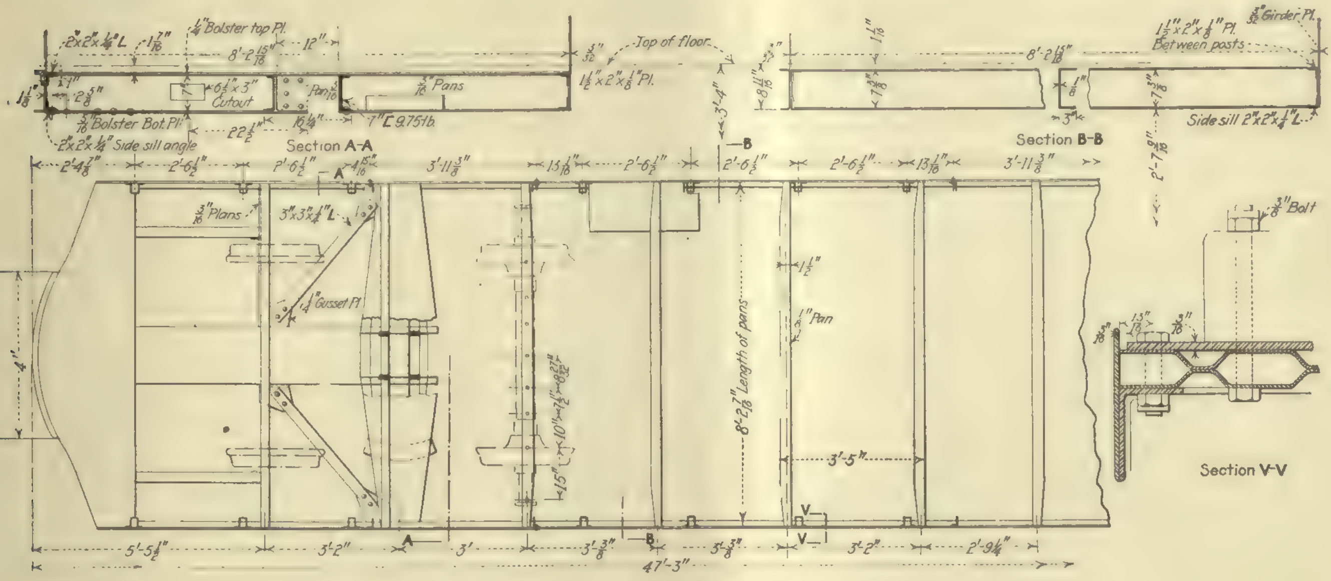
At about this time a trip was made to a number of large cities to see light-weight cars and to discuss our problem with car builders. From the information thus obtained, we concluded that it would be possible, by careful design and careful following of all details, to produce the car we required. We made drawings and specifications accordingly, one clause reading: "The weight of the car body, as delivered to the railway, must not exceed 19,000 lb."

The weight of the car bodies, as delivered to us by the Pullman Company, was 18,320 lb., or 680 lb. less than the weight specified, while the total weight of the car, complete, was slightly under 22 tons.

The operating costs for way, equipment and power,



Details of Side Framing for East Boston Tunnel Car



The Floor Framing Shows a Light but Strong Type of Construction

for these cars in the East Boston Tunnel service, based on $219 per ton per year,* will be approximately $108,000 per year less than if the service were performed by cars similar to those last placed in service on the elevated lines.

ELECTRIC DOOR OPERATING MECHANISM USED

There are two other features of note in connection with the East Boston Tunnel car. The Boston Elevated Railway was the first to operate car doors with pneumatic engines. The practice has now become nearly universal. It has made possible great improvement in operation and economy, but the use of compressed air for that purpose has some drawbacks. In the first place, the conversion from electrical energy to mechanical energy is accompanied by considerable loss. Compressed air is hard to confine and to prevent from leaking. The leak may be small at any one point, but there are numerous points and they are not readily accessible for testing or repair. This means that there is a constant leakage of air as long as air pressure is on the car and the compressor capacity must be proportioned to maintain proper pressure notwithstanding the air leakage. In the case of the East Boston Tunnel car, this meant that while a 16-cu.ft. compressor would be ample to provide air for brakes and control, a 25-ft. compressor would be required if air-operated doors were used. The difference in compressor weights was approximately 300 lb. These were important considerations, but the desirability of eliminating the troubles of sticking and slow working doors in cold weather was of greater importance, and if doors could be controlled directly by electric power it seemed that the results should be economical as well as beneficial from a service standpoint.

We built a car door model and equipped it with an electric motor and controlling mechanism. From the results obtained in this way we were satisfied that the scheme was practical. We issued specifications for electric door mechanism and the Consolidated Car Heating Company was the successful bidder. Our experience, so far, with the electric door operators indicates that they will be an improvement over the pneumatic door operators.

The introduction of light-weight cars of large carrying capacity introduced another problem, that of braking. The usual practice has been to adjust the braking pressure to the light weight of the car so as to reduce the liability of wheel skidding. This trouble is not only disastrous to the wheels but it is a well-known fact that sliding friction between wheel and rail is considerably less than rolling friction. For that reason a longer distance is required to stop a car when the wheels skid. This means that with the brake pressure adjusted to the weight of the car without load, there was no means provided for taking advantage of the additional friction or adhesion between wheel and rail due to the additional weight of the passenger load. This necessarily meant longer stopping distances even with maximum braking conditions, as the load was increased. With our steel elevated cars, the maximum passenger load amounts to 33 per cent of the dead car weight, which is not such a serious difference, but with the East Boston Tunnel car the proportion of passenger load to dead weight is 57 per cent and in the interests of safety and traffic capacity, this factor could no longer be ignored.

We had reached a point where some means must be applied for increasing the available braking pressure as the load was increased and conversely reducing that pressure as the load was decreased. Such a device was in use on the New York Municipal subway lines. On investigation, it was found to work very satisfactorily, but the design was such that it required considerable space for installation which could not be provided on our cars, and its weight amounted to 2,000 lb., which we could not afford. However, designs were submitted by the manufacturers showing a device which would accomplish practically all that the Brooklyn device accomplished; which could be installed in the space available and which weighed only 165 lb. This was adopted for both the No. 5 semi-convertible cars and the East Boston Tunnel cars. These brakes are operating very satisfactorily and seem to meet the conditions fully. It is possible to stop a loaded car in the same distance as that in which the empty car can be stopped. This should make for greater safety and materially add to traffic capacity on lines of dense traffic.

If the East Boston Tunnel cars were to be interchanged or operated with the present elevated cars and were to be subjected to the stresses imposed by the heavier cars, it would have been impossible to make any such reduction in weight; i.e., it would be impossible to design cars for our elevated lines with a weight of 44,000 lb. It may, however, be possible in building future elevated cars, by adopting some or all of the new features incorporated in the East Boston Tunnel cars, to make a material reduction in weight without sacrificing strength.

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*The derivation of this figure was given in an article in ELECTRIC RAILWAY JOURNAL for July 26, 1924, page 122.

Accident Prevention in San Antonio

A Feature Is the Use of Home-Made Bulletins, as They Give a Personal Touch—Their Use Has Been Followed by Accident Reduction

By Harold A. Briggs
Safety Supervisor San Antonio Public Service Company

WE BEGAN a special effort in accident prevention on the San Antonio traction system in November, 1923. The first two months were spent in reconnaissance and in forming an estimate of the situation.

In January, 1924, we began making a thorough investigation of every accident in which there was any doubt as to how it happened. We classified the responsibility for accidents into four classes, as follows, (1) trainman at fault; (2) trainman not at fault but the accident might have been avoided; (3) the other party at fault, no chance to avoid it; (4) company at fault.

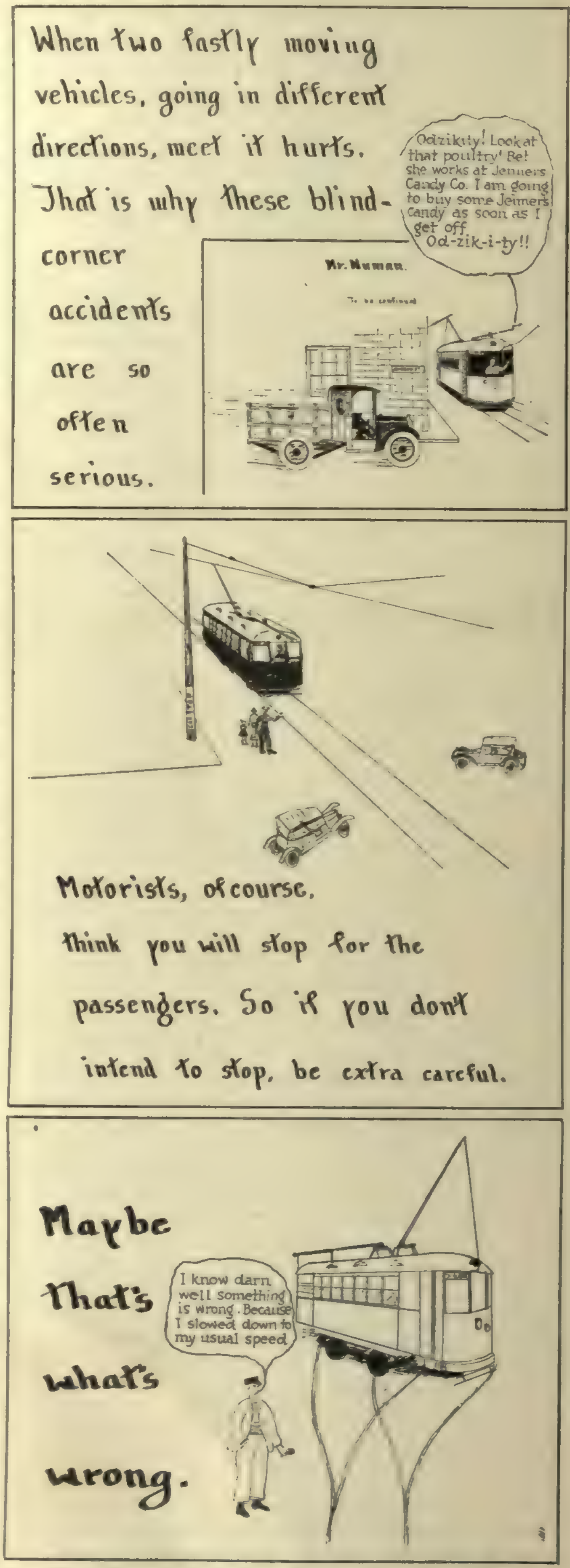
We also classified the accidents according to cause, such as "Following traffic too closely," "Too fast at intersections," "Inattention to duty," etc. With this information before us it was comparatively easy to lay our plans.

Believing that generally a man will do what is right if he knows what right is, we centered our efforts on showing the trainmen what it was safe to do and what was unsafe. A special study was also made of equipment, track, schedules in use, etc., with a view of making it easy for the man to do the right thing.

Our educational work has been carried out through personal instruction by line inspectors and by safety bulletins. The line inspectors who are daily in close personal touch with the men are kept advised of the accident situation by letter or information daily through the chief inspector.

When a man is found doing something wrong he is instructed on how to correct his trouble. After a few days and for some time afterward he is closely watched to see if he is following instructions. In most cases it is found that after the second warning or caution about a particular condition or habit, the man makes a strong effort to follow instructions. However, it has been necessary, in a very few cases, to let men out of the service because they could not, or would not, obey the rules.

Another feature of our educational plans that deserves special mention is our home-made safety bulletins. One great objection to the general safety bulletin is that it lacks the local and personal touch to make it attractive. And they so seldom fit the conditions that the company is especially fighting. Then again, a majority of those who do read them don't get the benefit they should out of them, because they think


When two fastly moving vehicles, going in different directions, meet it hurts. That is why these blind-corner accidents are so often serious.
Odzikity! Look at that poultry! Bet she works at Jenners Candy Co. I am going to buy some Jenners Candy as soon as I get off. Od-zik-i-ty!!
Mr. Numan.
To be continued
Motorists, of course, think you will stop for the passengers. So if you don't intend to stop, be extra careful.
Maybe that's what's wrong.
I know darn well something is wrong. Because I slowed down to my usual speed

These Home-Made Bulletins Pictured Local Conditions and Were Effective

"What does that bird in New York know about conditions here?"

We have been creating our own bulletins, and by using them in conjunction with personal drives by the line inspectors on the same subject have produced good results.

The first poster reproduced shows the dangers of inattention at blind corners, and at Johnson Street in particular. Johnson Street has been the scene of the first of a series of cartoons we called "Mr. Numan," showing some of the predicaments encountered by a new man.

The second poster is of more general interest and was drawn and put on our board the day after one of the men had demolished an automobile because of doing the very thing depicted in the poster.

The third poster was put out on the day after a one-man car had derailed his car by hitting a switch too hard.

The trainmen are beginning to look upon all of the posters now as true pictures of something which has happened, and the first question they ask is "Who did it?" This information soon leaks out and creates a great deal of friendly ridicule and good advertising of the cause of the accident.

These home-made bulletins are drawn to fit local situations and have been found effective at a time when the line inspectors are making a personal drive outside against the same conditions. Especially good results have been obtained.

In January, 1924, our classification showed 33 accidents that were the fault of the trainmen and 52 others that ought to have been avoided. In June the record shows 8 that were the fault of the trainmen and 37 others that ought to have been avoided. This makes a total of 45 in June against 85 in January that ought to have been avoided. Lest some of this gain should be credited to an improvement in the traffic conditions it should be explained that in January 60 automobiles hit street cars, and in June, 92.

There was also a good showing compared with last year. In June, 1923, we went 1,800 miles to an accident of the collision type. In June, 1924, the figures was 2,500 miles per accident.

Dispatching Helps Maintain Good Service

In Denver the Cars Are Operated on Regular Schedules Except When Unusual Conditions Require Special Orders from Dispatcher—System of Peak Load Reports by Telephone Gives Running Record of Loading and Keeps Each Crew in Touch with the Office

CONTROL of car movements by a central dispatcher is combined with regularly scheduled operation under normal conditions on the Denver Tramway Company's lines. In this way the minimum amount of supervision is required to handle the service when things are running smoothly, and at the same time any line on which abnormal conditions occur may be taken over quickly by the dispatcher and an emergency schedule operated under his direct supervision until normal service is re-established. With the combined system that is used, the cars run on time cards for the full 18-hour period, but if for any reason the service becomes irregular, the dispatcher immediately takes over the line, straightens it out and then puts it back on time-card operation.

MAXIMUM PASSENGER LOADS REPORTED BY TELEPHONE

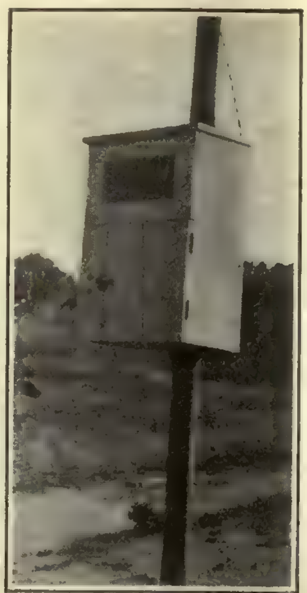
In combination with the dispatching arrangement, a system of peak load reporting by telephone serves the double purpose of putting each car in touch with the dispatcher's office at the end of each trip and at the same time furnishes a complete record of the loading on each line, so that additional service may be added on very short notice to handle unusual loads. At the end of every trip the trainmen report from telephones installed at the ends of all lines to special peak load operators stationed at a central telephone switchboard. These reports give the number of passengers on the car at the peak load point on the line. If the dispatcher is operating the line or desires to issue special instructions, the trainman is switched to the dispatcher's board. Otherwise, the train crew receives an "O. K." from the peak load operator and continues to run on the regular time card for his run.

The dispatcher is not merely a trouble man to take records of accidents and car defects, but spaces cars to take care of any unusual condition and is responsible to a large extent for the regular operation of all cars. It is evident that the system used gives a running check on the operation and loading of every car in service. This is obtained up to 11:30 p.m.

Peak load reports coming in from the trainmen are listed on special 5-in. x 8-in. cards in a visible "Kardex" file, so that a comparison for any number of days can be made readily for each run and trip. Separate records are kept for weekdays, Saturdays and Sundays. This record is carefully inspected each day for any unusual conditions. If a car was late during a trip and was overloaded on this account the fact is apparent from the record.

Each section of the Kardex frame in which the cards are filed corresponds to a certain group of runs on a given division of the system. These all terminate at points connected with a certain section of the switchboard assigned to one operator. Each tray of cards includes all the runs on these lines for a certain period of the day. Thus during a certain period all the reports coming in to a given section of the switchboard will be covered by the cards in certain groups of trays.

The cards are filed in the trays by lines, which makes it possible to locate the proper card promptly when a trainman reports over the telephone. The cards are made out in advance, each one containing space for the record of an entire week for a given run. This includes the leaving time from terminals, both inbound and outbound. When a trainman makes a report by telephone, he states to the operator the line on which he is operating the time he left the terminal and the number of passengers on his car at the peak load point, both inbound and outbound. The operator locates the proper



Telephones Located Near the Ends of All Lines Are Connected Directly with the Peak-Load Operators in the Dispatcher's Office

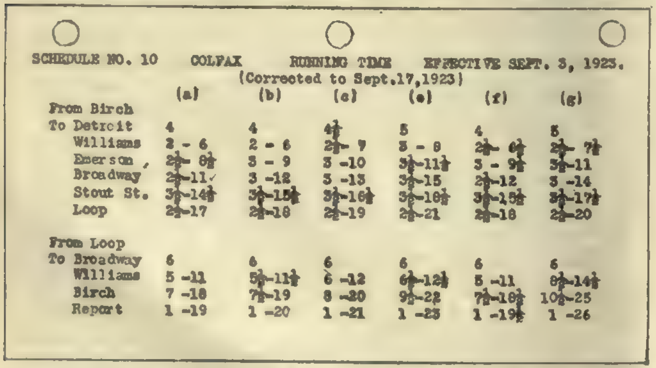
card for the line and then finds the leaving time indicated. This is facilitated by having the cards arranged consecutively in the file trays according to the terminal leaving times throughout the day.

As the peak load for each run is reported in, consecutive runs on each line show up in comparison with each other in the record, and unusual load conditions are at once noticed. When a car gets off its proper schedule the actual leaving time at terminals is recorded on the card by the operator and shows in comparison with the scheduled leaving time.

In drawing up a new schedule for any line the peak load cards are used as a guide. The reported loading is averaged for a predetermined period, so as to give the average peak condition for the various trips. The number of cars needed on each line for any given period is thus readily determined. In general, a load of 70 passengers on a two-man car at the peak point on the line becomes the basis for added service in the rush hour. In the non-rush period a seated load is the basis for determining the number of cars required, but on most lines, in order to hold the headway down so as to give maximum practicable frequency of service, the headway, and not the loading, becomes the basis for fixing the number of cars on the line.

EACH TRAINMAN CARRIES ALL SCHEDULES FOR HIS LINE

Schedules are first made up graphically. This shows at a glance the amount of dead time or layover at the terminals. With the schedule thus drawn up, the leaving time for each car is taken off and compiled in time-card form, with cars in service for the entire day shown for the full 18 hours. Extra cars to take care of the peak periods are shown in the same way. From these time-cards the runs are made up and the assignments are then distributed to the divisions for voting by trainmen. Time cards are printed and issued to trainmen. Each man on a given line is supplied with a book containing the time card for each run on the line he is working, as well as his own. Thus the trainman has all the time cards on his line, so that if the dispatcher switches him to another run he will have all the necessary schedule information. When placed on a run different from his regular assignment, a trainman continues to operate on it for that day, or until again changed by the dispatcher. The weekday schedules are printed on white paper, the Saturday schedule on green and the Sunday schedule on pink. The sheets are 2¾ in. x 6¾ in. As all the schedules for each line are included, there is one complete book outstanding for each car on a given line.



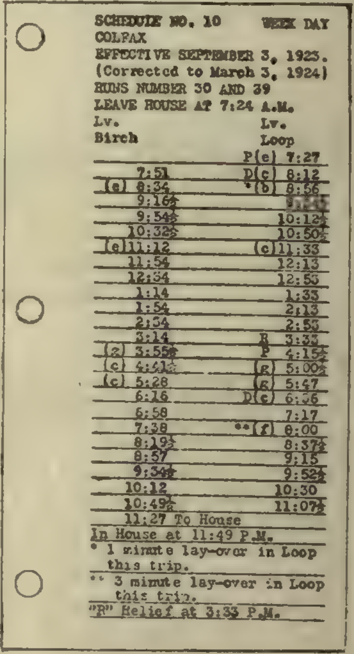
SCHEDULE NO. 10 COLFAX RUNNING TIME EFFECTIVE SEPT. 3, 1923.
(Corrected to Sept.17,1923)

	(a)	(b)	(c)	(e)	(f)	(g)
From Birch						
To Detroit	4	4	4½	5	4	5
Williams	2 - 6	2 - 6	2½- 7	3 - 8	2½- 6½	2½- 7½
Emerson	2½- 8½	3 - 9	3 -10	3½-11½	3 - 9½	3½-11
Broadway	2½-11	3 -12	3 -13	3½-15	2½-12	3 -14
Stout St.	3½-14½	3½-15½	3½-16½	3½-18½	3½-15½	3½-17½
Loop	2½-17	2½-18	2½-19	2½-21	2½-18	2½-20
From Loop						
To Broadway	6	6	6	6	6	6
Williams	5 -11	5½-11½	6 -12	6½-12½	5 -11	8½-14½
Birch	7 -18	7½-19	8 -20	9½-22	7½-18½	10½-25
Report	1 -19	1 -20	1 -21	1 -23	1 -19½	1 -26

A Sheet Is Included in Each Schedule Book, Showing the Running Time Between Important Time Points for Various Periods of the Day. The Dispatcher Specifies the Running Time to Be Used When Cars Are Not Operating on Schedules

In making up schedule books for the trainmen the regular men are furnished with books containing the schedules for the runs on one line only. The extra men in each division, however, carry books containing the schedules for all the lines operating out of the division to which they are assigned.

In addition to the regular schedules for the various runs, each trainman's book contains a sheet which gives the running time between the various time points at different hours of the day, as the running time allowance is varied to allow for differences in street congestion and amount of passenger load and interchanges. These various sets of running times for each line are indicated by letters, as (a), (b), (c), (d), as shown in an accompanying illustration. A sheet of this kind accompanies the group of run schedules for each line, so that the extra men are supplied with a running time slip for each line in their schedule books.



SCHEDULE NO. 10 WEEK DAY
COLFAX
EFFECTIVE SEPTEMBER 3, 1923.
(Corrected to March 3, 1924)
RUNS NUMBER 30 AND 39
LEAVE HOUSE AT 7:24 A.M.

Lv. Birch	Lv. Loop
	P(e) 7:27
7:51	D(c) 8:12
(e) 8:34	*(b) 8:56
9:16½	[illegible]
9:54½	10:12½
10:32½	10:50½
(e) 11:12	(c) 11:33
11:54	12:13
12:34	12:53
1:14	1:33
1:54	2:13
2:34	2:53
3:14	R 3:33
(g) 3:55½	P 4:15½
(c) 4:41½	(g) 5:00½
(c) 5:28	(g) 5:47
6:16	D(c) 6:36
6:58	7:17
7:38	**(f) 8:00
8:19½	8:37½
8:57	9:15
9:34½	9:52½
10:12	10:30
10:49½	11:07½
11:27 To House	

In House at 11:49 P.M.
* 1 minute lay-over in Loop this trip.
** 3 minute lay-over in Loop this trip.
"R" Relief at 3:33 P.M.

Each Trainman Is Furnished with Book Containing All Schedules for His Line. Weekday Schedules Are Printed on White Paper, While Saturday and Sunday Schedules Are Distinguished by Colors

When the dispatcher takes over a line in an emergency he instructs each man reporting by telephone to leave at a certain time, using running time (a), (b), (c), etc., as shown by the time card, until receiving further instructions. The line continues to operate on such telephone orders until all cars have been properly spaced, even though not in their regular locations. When this is accomplished, the dispatcher orders each man reporting to take the scheduled run corresponding with his position at the time of reporting. Each crew then continues to operate for the rest of the day on the assigned run, using the schedule given for that run in the schedule book.

Two factors make this method of dispatching cars practicable for the conditions in Denver. In the first place men are paid for straight time only, so that in the event of extra time because of change in the run to which a man is assigned, the operating cost is not thereby increased by the payment of a higher rate for overtime. In the second place, it has been found that the saving in the number of street supervisors required under the system of telephone dispatching helps to pay the cost of the telephone system and the operators required in connection with it.

USE INDEPENDENT TELEPHONE SYSTEM

A special telephone system forms the means for carrying out this arrangement. The system was installed and is maintained by the telephone company as an independent telephone service on a rental basis. This includes telephone stations wired directly to the dispatcher's office from the terminals of all car lines. These terminal telephones include a total of approximately 90 stations wired directly to the dispatcher's office. In addition there are a number of stations in the central business district which may be reached by trainmen or supervisors.

An accompanying illustration shows the arrangement of the telephone switchboard room in the dispatcher's office. The main peak load report boards are divided into four independent sections connected directly with the stations at the terminals out on the line. In this way the four peak-load operators work independently and communicate directly with the trainmen making reports, without any other switching operations. The dispatcher has a master board, to which any terminal telephone can be connected by means of a simple switching operation by the peak-load operator. Thus, when the dispatcher is operating a line, the particular peak-load operator assigned to that section connects incoming calls to his master board, so that the trainmen receive running instructions directly from the dispatcher. The station is also equipped with a P.B.X. exchange, so that connection may be made with any city telephone through the telephone company's exchanges.

Each peak-load report board assigned to an individual telephone operator has a maximum capacity of approximately 5 calls per minute. This fixes a maximum per operator of about 300 calls from cars per hour.

Peak Load Operators Receive Reports from Trainmen Each Trip. Dispatcher Takes Charge of Line When Unusual Conditions Occur

Compiling Individual Car Mileage in Detroit

Allocation of Car-Miles and Ton-Miles, Made Obligatory by Interurban-City Arbitration, Is Made by Use of Special Record Forms and a Powers Tabulating Machine—The Sorting and Printing Are Done Automatically

By I. N. MERRITT
General Auditor Department of Street Railways, Detroit, Mich.

COMPILATION of individual car-miles by the Department of Street Railways, City of Detroit, was made mandatory by the award of the board of arbitration in connection with the determination of a rate that the department should receive as rental for use of its track for the interurban operation of the Detroit United Railway. Parts of the award dictate a ton-mile rate, while others are on the basis of a straight car-mile division of cost. It was described in considerable detail in ELECTRIC RAILWAY JOURNAL for Jan. 12, 1924, page 67.

A number of systems were experimented with, resulting in the adoption of the method now in use. The Detroit street railway system embraces approximately 375 miles of single track spread over an area of 90 sq.m. The 2,000 cars, including interurban, service, etc., operate monthly 4,525,000 car-miles divided as follows:

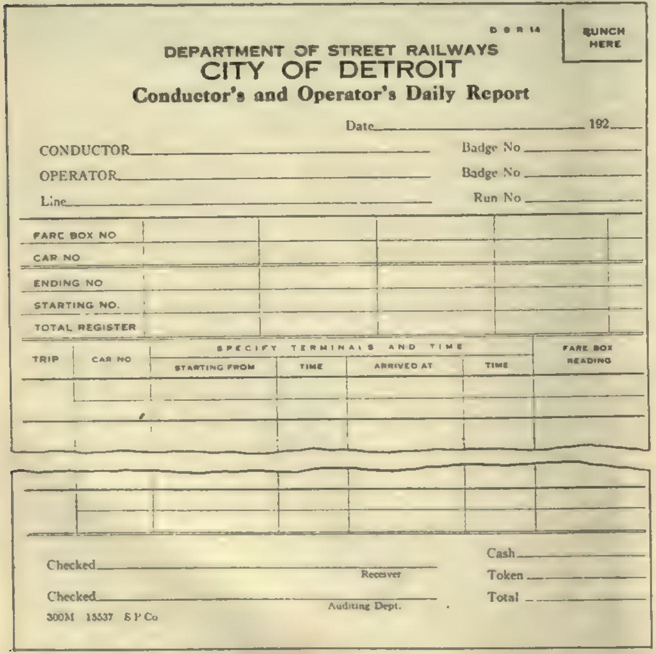
City passenger car-miles	4,300,000
Service car-miles	17,000
Interurban car-miles (D. U. R.)	200,000
Dead mileage	8,000
Total monthly car-miles operated on D. S. R. system	4,525,000

The division of the mileage into classes "A," "D." and "D.U.R.," depending on the type of track and cars, agreed to in the arbitration, is necessary to apportion the rental rate for interurbans, which is arrived at by knowing the combined total of all miles operated over the entire system, the rate being different for the different classes. The system invoked to accomplish this is unique in its simplicity and lack of forms required and it is believed, reduces to a minimum the functions necessary to obtain the final result.

The original information is taken from the conductors' daily trip sheets, the face of which is reproduced herewith. The back contains information on fares and transfers. Space is provided for listing terminal time of arrival and departure, time points and terminal time, car numbers, run numbers, number of trips, etc. In case there is any deviation from the schedules the conductor or operator is required to place an X opposite the part of the trip affected. At the completion of the day's work the operator or conductor turns in the trip sheet, which is checked by the station master to ascertain that he has received a trip sheet for each car or run dispatched and that they are properly filled out and contain all the required information. Then they are forwarded to the auditing division where the mileage is computed.

The schedule makers supply the auditing division with a draft of each schedule. The trip sheets when received are first checked again to see that each line or division is complete, by comparing them with the schedules and the report of schedule deviation forwarded each day from the stations. They are then segregated into groups or divisions, and four comptometer operators compute the mileage from the trips as shown. These operators are furnished with summaries of each schedule showing the starting and ending time and amount of mileage (divided into the various classes) for each run or section of run. The operators also have charts showing the distances between the various terminals of the several lines which they handle.

The mileage which each car has accrued is then entered in colored pencil on the trip report. Where no car change was made, and the run was operated exactly as scheduled, no computation is necessary, the mileage merely being posted as shown upon the schedule summary. In the event of car changes or omitted or additional service, which number about 50 per cent of the total reports, the mileage is computed according to individual trips.



D S R 14

BUNCH HERE

DEPARTMENT OF STREET RAILWAYS
CITY OF DETROIT
Conductor's and Operator's Daily Report

Date __________ 192___

CONDUCTOR __________ Badge No ______
OPERATOR __________ Badge No ______
Line __________ Run No ______

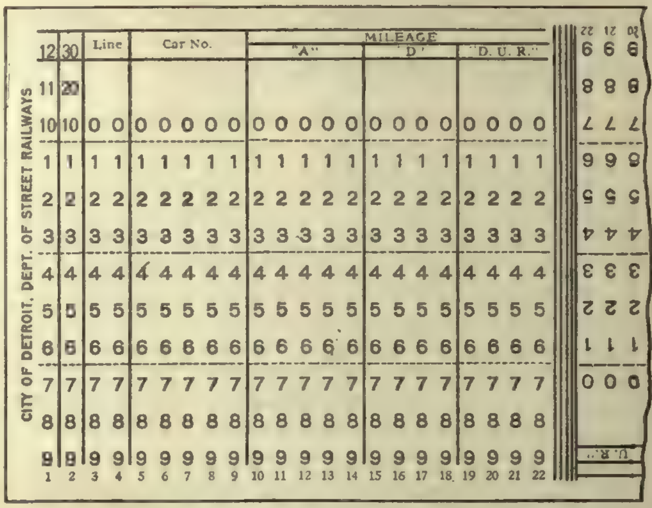
FARE BOX NO					
CAR NO					
ENDING NO					
STARTING NO.					
TOTAL REGISTER					

TRIP	CAR NO	SPECIFY TERMINALS AND TIME				FARE BOX READING
		STARTING FROM	TIME	ARRIVED AT	TIME	

Checked __________ Receiver
Checked __________ Auditing Dept.
300M 15537 S P Co

Cash ______
Token ______
Total ______

Face of Trip Sheet, Showing Trip Information from Which Mileage Is Computed. The Reverse Side Contains Report of Fares and Transfers



CITY OF DETROIT, DEPT. OF STREET RAILWAYS

12	30	Line		Car No.					MILEAGE "A"					"D"				"D. U. R."			
11	20																				
10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
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9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

Half of the Punch Card for Tabulation. The Other Half Is a Duplicate, so that the Card Can Be Used Twice

The balance of the segregating and listing of the mileage is accomplished by means of Powers automatic tabulating machines. Two punch machine operators perforate the cards, showing the date, car number, line number, and number of miles operated by the various classes. After punching, the cards are run through the tabulating machine, which prints a list of the daily mileage for each car according to lines and classes for preparation of the daily operating reports. The cards are then filed until the entire month is completed, after which they are sorted by the sorting machine according to car numbers, subsequently being run through the tabulating machine for listing of the month's miles operated by individual cars by classes of mileage. The two punch operators also handle all of the machine work.

The interurban mileage operated over city tracks is computed and tabulated in the same manner from trip reports furnished from the various interurban divisions. This operation requires one additional comptometer operator.

Every movement of a car is reported on some form of trip sheet. Approximately 2,500 are received daily from revenue, non-revenue, and service cars of the department, and approximately 400 from interurban cars. Each comptometer operater handles approximately 600 trip sheets per day. There are approximately 4,500 cards punched each day. The system contemplates the completion each night of the previous day's operations and in the first six days of the month the completion of the previous month's work by individual car-miles. The ton-miles are obtained simply by multiplying the total miles operated by the tare weight of the car in each case.

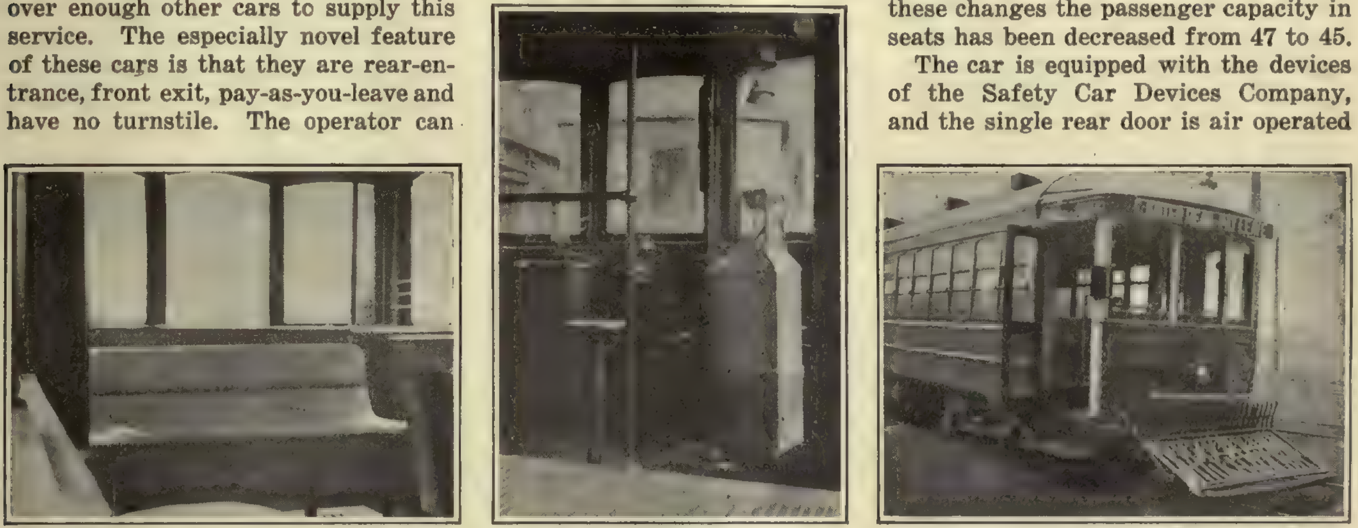
The individual car-mile record is transmitted to the maintenance divisions at the end of each month for use in connection with the maintenance of the rolling stock and for statistical information in general.

Although the system is a result of many nondescript experiments and was adopted to solve the compiling of individual car-miles, it has proved more than satisfactory, and beyond question, would be continued for this purpose even though the necessity of obtaining this record for segregating interurban costs were abandoned.

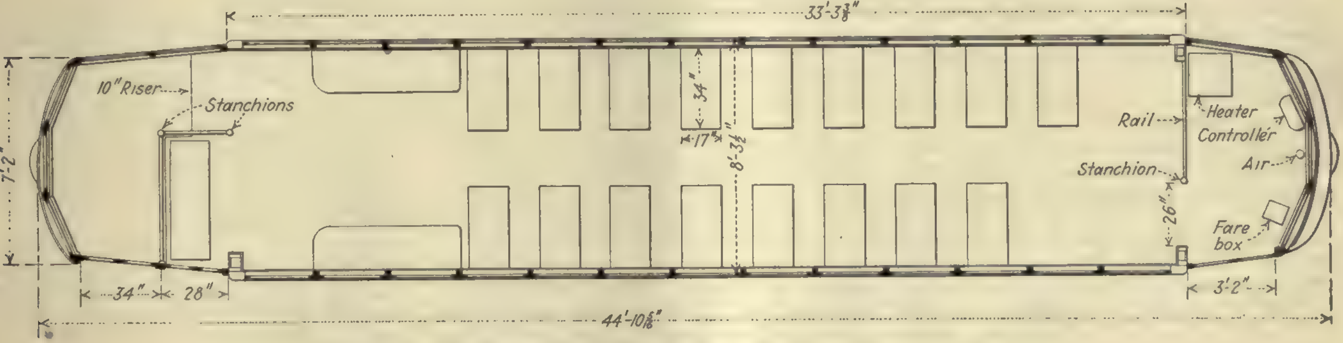
Rear-Entrance, Front-Exit, One-Man Car in Toledo

Ten of These Double-Truck Cars Are Without Turnstiles on a Belt Line—No Difficulty Has Been Found with Loss of Fares

SINCE May 4 Toledo has been operating double-truck one-man cars on the Bancroft belt line of that city. Ten cars have been rearranged for this purpose but six supply the basic service, two more are used during the rush hours and two are kept as reserve. These cars have given such satisfaction that within the last few weeks the company has decided to use the same type of rolling stock on about one-third of the lines in Toledo. Plans are being made to make over enough other cars to supply this service. The especially novel feature of these cars is that they are rear-entrance, front exit, pay-as-you-leave and have no turnstile. The operator can keep the rear entrance under close inspection while the rear door is open and does so to watch boarding passengers. He would be practically helpless, however, to stop any passenger getting off the rear platform without paying his fare. In fact, his instructions require him simply to report cases of this kind and not try to stop them. Up to this time the company has not suffered any loss in this way.



Rear and Front Platforms and Front View of One-Man Car



Plan of Rear-Entrance, Front-Exit, Pay-as-You-Leave, One-Man Car

This is the second attempt of the Community Traction Company of Toledo to operate one-man cars. A previous effort in November, 1922, was stopped by order of the Council on the ground that it was not permitted under the present franchise. While there has been a growing public sentiment favoring one-man cars, the city's legal department has been asked by the Council to ascertain the legal status of the cars.

The Bancroft belt line operates through a territory quite densely populated but one that has lost considerable traffic during recent years through the widespread use of private automobiles. There is not so heavy a rush-hour traffic on this line as on some of the radial lines or those which pass through the factory districts. Most of the rush-hour traffic on the Bancroft belt line is transfer business and shoppers returning from the downtown section.

A plan of the car used, with two interior views are presented. Originally the car was a single-end rear-entrance front-exit car, with a 6-ft. 7-in. rear platform equipped with two doors. From this platform there was a 10-in. riser to the car floor. In the change to one-man design one of the rear-entrance doors has been closed up and the car floor extended back to allow room for a seat for three passengers. By these changes the passenger capacity in seats has been decreased from 47 to 45.

The car is equipped with the devices of the Safety Car Devices Company, and the single rear door is air operated by a selective control which permits the motorman to open and close either door or both by different movements of the same lever. The cars are fitted with Westinghouse 310C motors, air brakes and K36 control. They were built originally by the McGuire-Cummings Manufacturing Company and are heated with hot air.

A ceiling sign within the car reads: "Please move as far forward as possible, leave by front door, pay as you leave—Exact fares will speed up service." A sign on the outside of the car reads: "Enter rear—Pay as you leave." The fares charged are: cash—8 cents; four tickets for 25 cents; children (8 years and under) 1 cent; children (in arms) free; transfer 1 cent. A self-registering farebox is used, the transfers being collected and registered separately by the operator by means of a pedal.

Association News & Discussions

Tests for Motormen and Bus Drivers*

A Number of Psycho-technical Tests for Platform Employees Have Been Used in Paris for Some Time—They Have Now Reached a Point Where the Laboratory Is Correct in from 80 to 90 per Cent of the Cases—This Means a Large Monetary Saving

By L. BACQUEYRISSE
General Manager in Charge of Operation Paris Transportation Company

FOR many years scientific principles have been applied to the examination of applicants for street railway service. On the larger systems this subject is becoming of constantly more importance, partly because of the increasing cost of accidents caused by incapacity of the personnel and partly because a great number of (French) undertakings pay their men during periods of illness.

AGE LIMIT

Replies to the data sheet from thirty-seven members of the association show that all have minimum and maximum age limits. Shortage of men during the World War led, in the case of conductors, to an 18-year minimum limit in ten cases and a 17-year limit in two. With twenty-one companies the age limit is from 20 to 22. Copenhagen sets the minimum as high as 25 years and Amsterdam at 23. Very young men are not considered sufficiently serious or steady.

The maximum age limit is usually between 30 and 35 years, but in some instances this has been raised to 40 years for war veterans.

In the case of motormen and omnibus drivers, or chauffeurs, eleven railway systems reported that men under 21 years of age were accepted, while the remaining twenty-six set 21 years as the minimum. The maximum age varies usually between 30 and 35 years, partly to insure suppleness of mind and partly (as with conductors) to insure a suitable number of years employment in connection with pension regulations. The tendency is toward men of 21 years minimum who have served their time in the army and attained the desired stability of character. Statistics have also shown that the very young men as drivers are inclined to the recklessness that causes accidents. This is indicated in an analysis of the accidents on the Paris Tramway-Bus system for which motormen or bus drivers were responsible, occurring during the months of January, 1921, April, 1922, and October, 1923. The tramway and bus accidents have been tabulated separately on two bases. In one the accidents were grouped according to the ages of the motormen or bus drivers involved. In the other there was a similar grouping according to the years of service of these employees. The results are shown in Fig. 1. They embody (for the October, 1923, period) the records of 3,611 motormen and 2,037 bus drivers. For the earlier periods the numbers of each class were somewhat less.

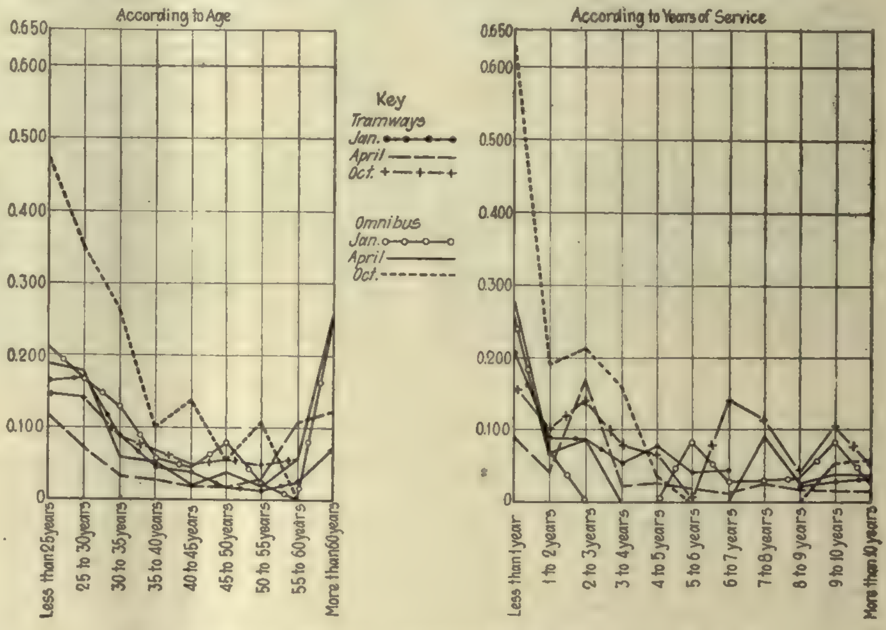


Fig. 1—Average Monthly Accidents per Vehicle Operator, Paris

The graphs based on the age of the men show a gradual decrease of accidents with advancing years, but with a turn for the worse among the men more than 50 years old. These differences are more sharply accentuated in motor-omnibus operation which is conducted under conditions of maximum congestion. The graphs based upon years of service also show a much greater proportion of accidents from beginners.

CONDITIONS AS AFFECTED BY SEX

Preceding the World War the platform employees consisted of men only. The war, of course, led to the employment of female car operators in large numbers. No choice could be exercised at the time, owing to the fact that women were also being drawn into so many other man-short industries. It is therefore impossible to make a comparison that would be fair to the women. It is to their credit, however, that female drivers for cars and buses, who usually had served previously as conductors, did not tend to show a greater proportion of accidents than male operators. As demobilization proceeded, almost all of the front-platform jobs were vacated. There are still many female conductors, but they are bound to go sooner or later.

EMPLOYMENT CONDITIONS AS AFFECTED BY PHYSICAL CONDITION

All companies replying said that they insist upon a medical examination. On small properties the examination is conducted at the office of a responsible physician who certifies whether the applicant for employment appears fit for platform service. Larger systems usually have their own medical examinations, supplemented by laboratories.

**Annual Convention
and Exhibits**

*A. E. R. A.
Atlantic City, N. J.*

October 6, 7, 8, 9, 10

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*Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

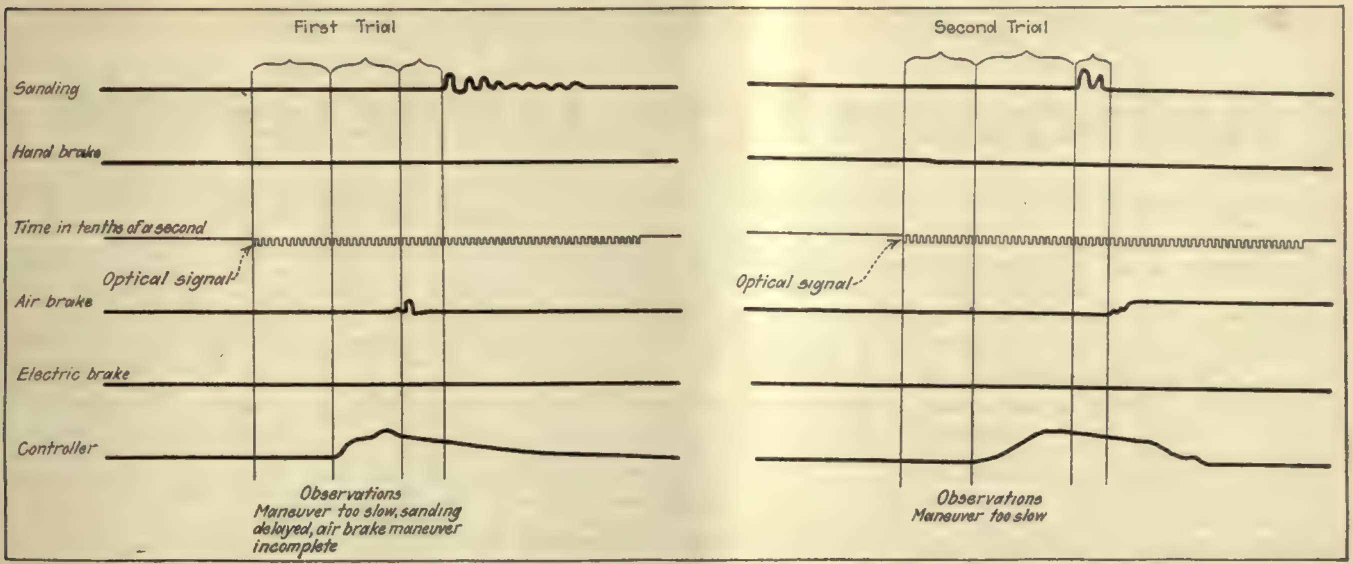

Fig. 2—Graphic Record of Platform Tests, Brussels

Since the applicant may be employed either on the front or rear platform, the examination covers the qualities required in both jobs. The tests appear to be severe, judging by the variety of questions and examinations, including urine analysis. In doubtful cases blood pressure is measured and use is also made of the Bordet-Wasserman reaction to determine incipient syphilis. A few systems also call for trials of muscular strength.

Where it is clearly understood that an applicant will be employed specifically as motorman or conductor, less onerous eyesight conditions are set for the conductor candidates. For instance, motormen (with rare exceptions) must have good vision without glasses, whereas the use of glasses is no bar to the conductor. There are also certain tolerances for conductors in the tests on sharpness of vision based on Monnoyer's scale. Red, green and yellow are employed in color tests.

From its own experience, the Paris system finds that modern traffic conditions call for the best possible eyesight on the part of motormen and bus drivers, particularly in judging speeds and distances, danger of collision with cross traffic and sharpness of vision in twilight, the latter as determined by laboratory test.

With regard to hearing, only two out of eighteen companies reporting made no special tests. The author does not consider the usual standards high enough in the case of motormen and bus drivers, as trials have proved that a person with subnormal hearing tends to locate the origin of various sounds behind him when some actually have originated in front of him. A motorman thus afflicted would get into trouble with an unexpected vehicle. He should also learn to appreciate that the sounds made by various vehicles are affected by their rate of speed.

PSYCHOLOGICAL TESTS FOR CAR OPERATORS

With regard to mentality, the growing severity of traffic conditions makes it highly desirable that transport undertakings make the fullest possible application of the advances in psychology. The employment of men most apt for the service will give safer operation for the public, reduce accident costs, cut down the waste of energy and minimize upkeep charges.

As early as 1700 Vauban made a time and motion study of different classes of work. Some years after physiologists, following the road opened by Lavoisier, began to determine the relations between muscular energy and food (fuel) values. Then came a series of studies by numerous scientists down to this day with its host of volumes on the psychology individual to different professions. The work of vehicle operators has already given birth to valuable knowledge as summarized in the following paragraphs:

The first applications of psychology to platform work were made simultaneously in 1913 at Harvard University and by the former East Parisian Tramways (Compagnie des Tramways de l'Est-Parisien). During the war years the methods applied in choosing men for the air service were a guide to

TABLE SHOWING RELATION BETWEEN EXCITATIONS AND REACTION IN VISUAL AND AUDITORY TESTS

Name .... No. of Errors: 5 Accuracy Index: 0.94

Excitations		Reactions				Excitations		Reactions				Excitations		Reactions			
Lamp	Sounds	Left Foot	Right Foot	Right Hand	Errors	Lamp	Sounds	Left Foot	Right Foot	Right Hand	Errors	Lamp	Sounds	Left Foot	Right Foot	Right Hand	Errors
Red	Metal				|	Red	Wood	×				Red	Wood	×			
Green	Metal				|	Red	Wood	×				Red	Wood	×			
Green	Wood		×			Green	Wood		×			Red	Metal	×		×	
White	Metal	×	×	×		White	Metal	×	×	×		Red	Metal	×		×	
Red	Wood	×				White	Metal	×	×	×		White	Wood	×	×		
Red	Metal	×		×		White	Wood	×	×	|	|	White	Metal	×	×	×	
Red	Wood	×				Red	Metal	×		×		Green	Wood		×		
White	Wood	×	×			White	Wood	×	×			White	Metal	×	×	×	
White	Wood	×	×			Green	Metal		×	×		Red	Wood	×			
Green	Metal		×	×		Green	Metal		×	×		Green	Metal		×	×	
White	Metal	×	×	×		White	Metal	×	×	×		Green	Metal		×	×	
Red	Wood	×	|		|	Red	Metal	×		×		Green	Wood		×		
Green	Wood	×	×			Green	Wood		×			Red	Metal	×		×	
Red	Metal			×		Green	Metal		×	×		Red	Wood	×			
Red	Wood	×				Red	Wood	×				White	Metal	×	×	×	
Green	Metal	×	×	×	|	Green	Wood		×			Red	Wood	×	×		
Green	Metal		×	×		White	Metal	×	×	×		Green	Wood		×		
Green	Wood		×			White	Wood	×	×			Green	Metal		×	×	
White	Metal	×	×	×		Red	Metal	×		×		White	Wood	×	×		
Red	Metal	×		×		Red	Metal	×		×		Green	Wood		×		
White	Wood	×	×			White	Metal	×	×	×		Green	Wood		×		
White	Metal	×	×	×		Red	Wood	×				Green	Metal		×	×	
Red	Wood	×				Green	Wood		×			White	Wood	×	×		
Green	Wood		×			White	Wood	×	×			White	Metal	×	×	×	
White	Wood	×	×			White	Wood	×	×			Red	Metal	×		×	
Green	Metal		×	×		Green	Metal		×	×		Red	Wood	×			
White	Metal	×	×	×		Red	Wood	×				Green	Metal		×	×	
White	Wood	×	×			Green	Wood		×			White	Wood	×	×		
Red	Wood	×				Red	Metal	×		×		Red	Metal	×		×	
Green	Wood		×			Green	Metal		×	×		White	Metal	×	×	×	

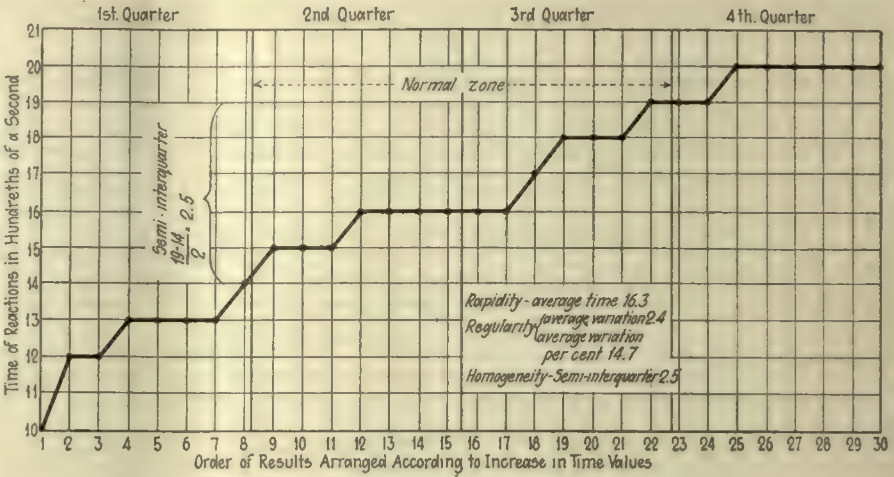

Fig. 3—Record of Reaction Times to Simple Sounds, Paris

psycho-motor tests for women operators of the former Parisian Tramways (la Cie. Parisienne de Tramways). Army tests of this nature as applied to 20,000 automobile drivers showed that nearly 20 per cent were unfit and that ability decreased from 40 years on.

In more recent years psychological tests have been applied by the systems of Amsterdam, Barcelona, Brussels, Milan, Paris, Philadelphia, the German State Railways and others. Examination of results indicates that failure to start with a precise analysis of the job of car or bus driving has caused disappointment in some cases.

This analysis must be based upon a graphic motion study of vehicle operation, under both the diverse conditions of actual running and of laboratory tests where everything can be done in logical order. One aid toward the achievement of this result is the use in Paris of registering and recording devices on cars in every-day service. The following inventory of points to observe has been set up:

Attention or distraction (tests of Amsterdam, Barcelona, Brussels, Harvard, Paris, Philadelphia) is one of the most important to determine in the case of motormen and bus drivers as they are subject to numerous excitations. The tests show how a man reacts, with appropriate handling of his apparatus for a service or emergency application of the brakes, sanding, etc.

Concentration (tests of Amsterdam, Barcelona, Milan) is an analagous function, but in this case there is a single reaction to a single excitation.

Rapidity and regularity of physical reactions are studied by all, but some consider this function as simply a form of attentiveness and others as a simple muscular function.

Local muscular force, i.e., transmission to the muscles and the muscular system which come into play in the motorman's work.

Fatigue resistance (tests of Milan and Paris).

Motor suggestibility (test of Paris) is defined as the subject's aptitude for developing a sense of touch and muscular action that will enable him to exert just the right degree of control almost automatically (or subconsciously) amid all the confusing calls on his attention when running over a busy highway.

Judging speed and distance (tests of Amsterdam, Barcelona and Paris).

Rapidity in perception of images (tests of Paris).

Perception of sound direction.

Impulsiveness (tests of Amsterdam, Barcelona and Paris).

Memory (tests of Milan and Paris).

Intelligence. One does not expect intellectual eminence in motormen and bus drivers, but since intelligence does play a big part in all human activities even candidates for such humdrum work ought to possess a certain minimum of this quality.

METHODS OF PSYCHO-PHYSIOLOGICAL SELECTION

Space does not permit an account of all of the researches made by various undertakings to discover the aptitude of candidates, but the methods can be classified into two groups: (1) That in which the candidate is placed in the psychological condition of a motorman at work to respond to stimuli which simulate street conditions, and (2) that in which a series of purely analytical tests are made.

The former method is that used at Harvard University, Philadelphia and Brussels. Its value is not yet established. In any case it seems premature to admit that a single test of this nature should be allowed to replace one made under practical conditions where a much greater diversity of psychological functions are called into play.

In the case of Hamburg, the quickness of response and correctness of manipulation are noted in the course of the student's schoolroom lessons with actual apparatus, while watching a moving belt, illuminated from the back on which are various marks to represent "proceed," "stop," "man on track," etc. No effort is made to discover the future ability of the candidate as a motorman all at once, but the method does offer a practical examination which reveals the subject's aptitude for learning.

At Brussels the student or veteran under test actuates a pneumatic recording device with each manipulation of the control or braking equipment made in response to various excitations, such as images of vehicles and pedestrians. The times between the excitations and reactions are measured in tenths of a second. Fig. 2 is a typical record. The same scheme is employed at Paris in connection with the preliminary psychological tests. It is noteworthy that the Hamburg plan, which began only as a series of manipulations of apparatus, has become more and more analytical. It now includes, for example, tests in judgment of speed and distance.

With regard to the analytical tests, their effective use is a matter of combining and comparing the results from a variety of experiments, such as the following:

Attention or distraction test. The subject is usually placed in a dark room. Visual attention is then determined by causing the lighting of lamps of various colors in a predetermined order. Likewise, audition is tested by the production of various sounds. The subject's reactions are obtained by means of his differing manipulation of keys or pedals, following the display of different colors or the sounding of different noises. The accompanying table gives the record of a candidate on the Paris tramways who showed an accuracy of 94 per cent.

At Hamburg the subject of this test is asked to keep count of the successive illumination of a lamp despite the occurrence of some mental shock or the distraction caused by the lighting of other lamps. At Paris the latter supplement to the reaction test is effected by means of a moving-picture screen in service and lamps placed around it. The results of this test are determined by reference to the number of errors or omissions in the total number of excitations.

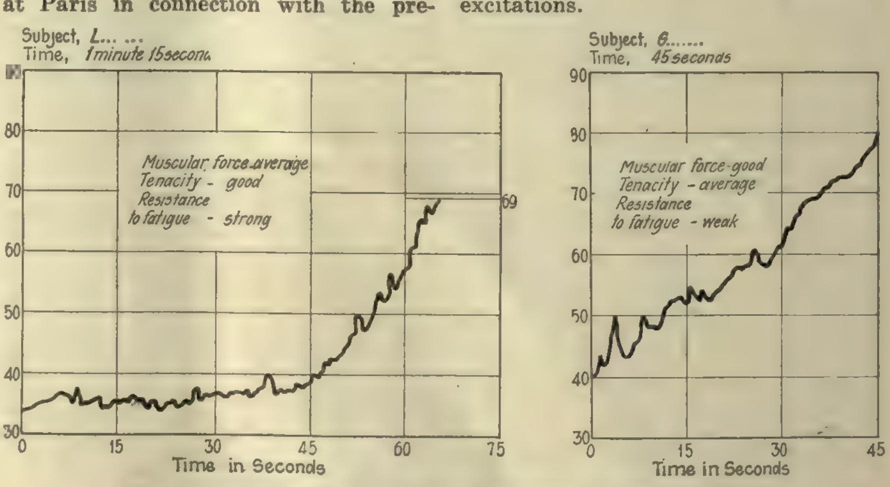

Fig. 4—Graphs of Good and Poor Resistance to Fatigue, Paris

Concentration. Only Milan has applied the classical test of the presentation of printed test cards, carrying certain symbols or signs. Dissatisfaction in that city with the results confirms the objections of those psychologists who had discarded this method. Others have considered the duration of reaction time as a proper measure of the concentration required by the work of a motorman. This is so only when based upon a large number of such tests so that, as at Amsterdam, the average between high and low values of each individual will serve as the concentration index or graph, as the case may be.

Promptness of reactions. Reactions to sounds are considered more practical than reactions to light because sound excitations are faster, but, of course, the results both ways should be compared for the best understanding of the situation.

The audition test is made by striking a special hammer on a table, whereupon the subject presses a key as rapidly as possible. Both hammer and key in making their contacts close a circuit to a chronograph which indicates in hundredths of a second the elapsed time between excitation and reaction. The figures are arranged in order of value, as shown in Fig. 3, to determine the qualities of rapidity, regularity and homogeneity.

At Left—Test for Resistance to Fatigue; the Record Is Shown in Fig. 4. At Right—Test for Suggestibility; the Record Is Shown in Fig. 5

Rapidity is determined by taking the average time interval. An excessively long interval would cause the rejection of the candidate, but generally speaking the rapidity or tardiness of the subject is not the sole standard of judgment.

Regularity is determined by comparing the difference in time between successive reactions against the average of preceding differences in time. It is evident that this is a check of stability or psychomotive equilibrium, a quality which plays a large part in determining the aptitude of a vehicle driver.

Homogeneity, which might be considered as consistency in reactions, is determined by grouping the records given in Fig. 3 in four parts in the order of the time interval. The values of the first and fourth quarters are considered as aberrations and therefore are not utilized. The values in the second and third quarters are treated as the zone of normality. The consistency factor is then taken as half the difference between the last value of the third quarter and the last value of the first quarter. This is figured and called "semi-interquarter" on the graph, Fig. 3.

Muscular force. Unless the hand brake is in frequent use, a test to determine this quality is of no value save as a measure of resistance to fatigue. One of the devices used is Charles Henry's dynamograph. The applicant for employment squeezes a bulb filled with mercury which is thus forced up a tube open at the top. A float in the mercury serves to actuate a recording pen. Two typical records from this device are shown in Fig. 4. The record at the left, while showing a longer period of rise, has fewer peaks and indicates that the person making the record may have less strength but he has greater tenacity and so is less liable to fatigue than the person who made the record at the right.

Motor suggestibility. Tests for this faculty (which has already been defined as a sense of touch and a control of muscular action almost subconscious) have shown a definite relation to ability to operate vehicles in everyday practice. Measurement is made with the Binet apparatus, a cylinder with two recording wheels, one of which is turned by the examiner and one by the subject. When the examiner's wheel is turned it turns that of the subject, but by means of a ratchet the subject can turn his wheel independently of the examiner. After a bandage has been placed over the eyes of the subject the test begins. The examiner simply turns and stops his wheel while the subject strives to begin and end the turning of his wheel in synchronism with that of the examiner. The general method is shown by an accompanying illustration. Fig. 5 is the graph of a normal subject with good sense of touch, showing close parallelism to that of the examiner, while that of a subject not having this faculty shows almost no resemblance to the movements of the examiner.

Judgment of speeds and distances. Analysis of many accidents has shown that the driver's judgment of speed and distance was usually found at fault.

To check this quality, the Paris system has devised what it terms a tachodometer. This comprises a skeletonized table about 13 ft. long on which three toy cars are run at varying speeds and distances. The cars themselves are out of sight, but their position is revealed by projecting masts. These masts aid the examiner to read the distances on the scale which forms a fence for the cars. The subject, of course, is too far away to read the scale. The test consists in disposing the cars in various positions and at different speeds, whereupon the subject is asked to tell in what order the vehicles will meet and at what point. In sizing up the replies, allowance is made for both their rapidity and exactness. At Barcelona this test is considered one of the most important and has justified itself by the results in practice.

Rapidity in perception of images. This quality is important in a vehicle operator as an aid to avoidance of collisions. The apparatus used for this purpose, called a tachistoscope, includes a rotating disk with a slit of variable size. Through this the subject glimpses words, letters and simple pictures thrown on a dark-room screen. The exposures are for intervals from one-tenth to one-thousandth of a second, so that a test can be made of the ratio of recognitions by the subject.

Recognition of sound direction. Reference has already been made to the importance of this test. The subject is blindfolded and then he is asked to indicate from what directions the various sounds are coming.

Impulsiveness. A man who can do everything just right under conditions of security is not much good as a motorman if his emotions can be easily excited. Yet it is not an easy test to make because not all emotions affect everyone alike. Furthermore, a laboratory test may show one thing, and an actual roadway emergency something else. Since all emotions probably have a common center, the most profound researches may be required for a fully satisfactory answer.

However, one helpful test is that of psychic reflexes via a galvanometer. The subject places two fingers of the same hand on non-polarized electrodes in a circuit of less than 2 volts with a Wheatstone bridge in series to measure his resistance. A galvanometer is used to follow the variations in resistance. Note is then made of the intensity of this variation under a variety of emotional shocks or distractions. In one Paris test, a good subject showed a drop from 8,200 ohms, before putting on the test film, to 7,000 ohms following the fourth shock to his emotions, while a poor subject dropped from 7,300 to 5,300 ohms under the same conditions. The Paris system has found a close relationship between the imperturbability (*sang froid*) shown in the analytical tests and those involving the use of equipment.

As soon as a student is reasonably familiar with his equipment, he is put through a test in which unexpectedly a dummy is thrown 33 to 50 ft. in front of the car or motor bus. This so staggers some operators that they abandon their control and brakes. Others are excited to the point of vomiting (one man was ill for two days), while still others apply the brakes too late. The practical effect of this test is to eliminate about 3.5 per cent of the motorman candidates and 5 per cent of the chauffeur candidates.

Memory. Car operators, of course, must have a good memory for the variety of conditions along their run, for signal indications, complicated rules and the like. The usual memory tests are not quite suitable for men in the motorman-chauffeur class. However, application is made of the scheme of word association [somewhat similar to that of the San Francisco Municipal Railway as described in the ELECTRIC RAILWAY JOURNAL for Dec. 8, 1923.—EDS.] The examiner reads to the subject twenty-five pairs of words having some relation in sound or meaning. He then calls off one word of each pair, the subject being expected to give the corresponding word. The comparisons are based on both the accuracy and the speed of response.

Intelligence. The tests so far used, such as the classification of diverse objects, apparently have not given definitely satisfactory results.

Deductions from combined tests. The essential point to consider is that no one test should be used as a basis for the selection of men, but rather that a judicious combination should be made from each type of analysis and with due correlation with the examinations involving manipulation of equipment. To achieve this end best, it is desirable that the greatest possible amount of data from international experience be made available so that a closer and closer relation will be obtained between a given kind of test and its practical application as a measure of the efficiency of the subject as an operator.

OPERATING RESULTS IN PARIS PROVE EFFICACY OF PSYCHOLOGICAL TESTS

To show concretely the relation between the psychological tests and the behavior of successful candidates on the road, the Paris company made the following test:

Several groups of fifty applicants for positions as motormen for cars or drivers for buses were chosen. In one sense these men were already a select class because the company accepts applications for the front end only from employees who have already made good records as conductors. They were also of like ages to make the comparison of greater value. Fig. 6 shows the diverse reaction times of the first fifty. The results were divided in ten classes. Class 1 was called "very good"; classes 2 and 3, "good"; classes 4, 5, 6 and 7, "medium" or average; classes 8 and 9, "poor," and class 10, "very poor." These results were adjusted by various compensation factors based on other tests, and as applied to this and later groups resulted in placing the men in four categories.

To determine the relation between the laboratory and practical ability of the first group (all motormen), arrangement was made to have them examined in service by one of the most trusted and capable platform inspectors. Thirty-six out of the fifty were in this operating test, as two had been eliminated in the course of their apprenticeship and twelve had been assigned to other work or had resigned. None of the thirty-six was examined until at least one month's service, it being recognized that more than one man who shows well during apprenticeship and laboratory tests falls back to his natural low level and proves unsatisfactory when left to himself.

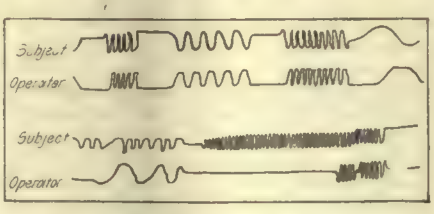

Fig. 5—Record of Tests of Motor Suggestability, Paris

From a comparison of the results of the laboratory tests and service judgments of the thirty-eight, the following facts appeared:

1. Of twenty-seven men classed as "apt" by the laboratory, twenty-three were classed as "good" and four as poor" from the operating viewpoint.

2. Every one of the eleven men classed as "not apt" by the laboratory was classed as either "poor" or "very poor' from the operating viewpoint.

In short, laboratory and operator agreed in thirty-four out of thirty-eight cases, or 89.5 per cent. Where the operator's judgment differed from the laboratory's, the latter profited by securing hints as to the nature of additional tests for bringing out weaknesses heretofore concealed.

Comparisons were made of further groups of fifty with particular reference to the qualities of resistance to fatigue, emotionalism, quickness in perception of images and judgment of speed and distances.

In the second series, thirty-six out of thirty-eight "apt" men were considered "good" and two "poor." Of twelve men classed "not apt," four were considered "good" and eight "poor." In this group of motormen, therefore, the percentage of agreement was 88 per cent.

In the third group were forty-eight candidates for motor bus driving. Of thirty-three classed "apt," thirty were considered "good" and three "poor." Of fifteen classed "not apt," eight were considered "good" and seven "poor." In this group of chauffeur candidates, therefore, the percentage of agreement was 77 per cent.

The average percentage of agreement for the three groups of 136 men was 84.5 per cent.

Such results justify the Paris management in advising others to follow like methods and also to study closely the percentage of agreement between laboratory and operator to the end that it may be raised still higher. The Paris psycho-technical laboratory is equipped to test ten men a day, a capacity which is sufficient to care for all applicants for the position of motorman or bus driver. The collaboration between laboratory and operating tests will be continued.

INSUFFICIENT TESTS ACCOUNT FOR POORER RESULTS AT BRUSSELS

In the case of Brussels, which uses the test in which the candidate is placed in a condition simulating operating routine, the correlation percentage was much less than at Paris. Of thirty-seven men so examined, seventeen had been termed "apt" and twenty, "not apt." All of these men were then put to work and after two months were classified as "very good" if they had caused no accident, "fair" if they had caused but one accident and "poor" if they had caused more than one accident.

Of the seventeen men classed as "apt" by the laboratory, six proved "very good;" seven, "fair," and four, "poor."

Of the twenty classed as "not apt" by the laboratory, three proved "very good"; seven, "fair," and ten, "poor."

Two reasons are offered for the poorer results at Brussels: First, a single test does not take account of such factors as resistance to fatigue and the suggestability factor, which the Brussels management proposes to consider hereafter; second, a classification based upon freedom from accident leaves too much to chance since it is conceivable that a poor operator might have the luck to escape accident-creating conditions.

The Philadelphia method is reported to give an agreement factor of 80 per cent.

At Berlin 5 to 12 per cent of the motormen used to be eliminated during the apprenticeship period. To-day, with psychological selection in use, the

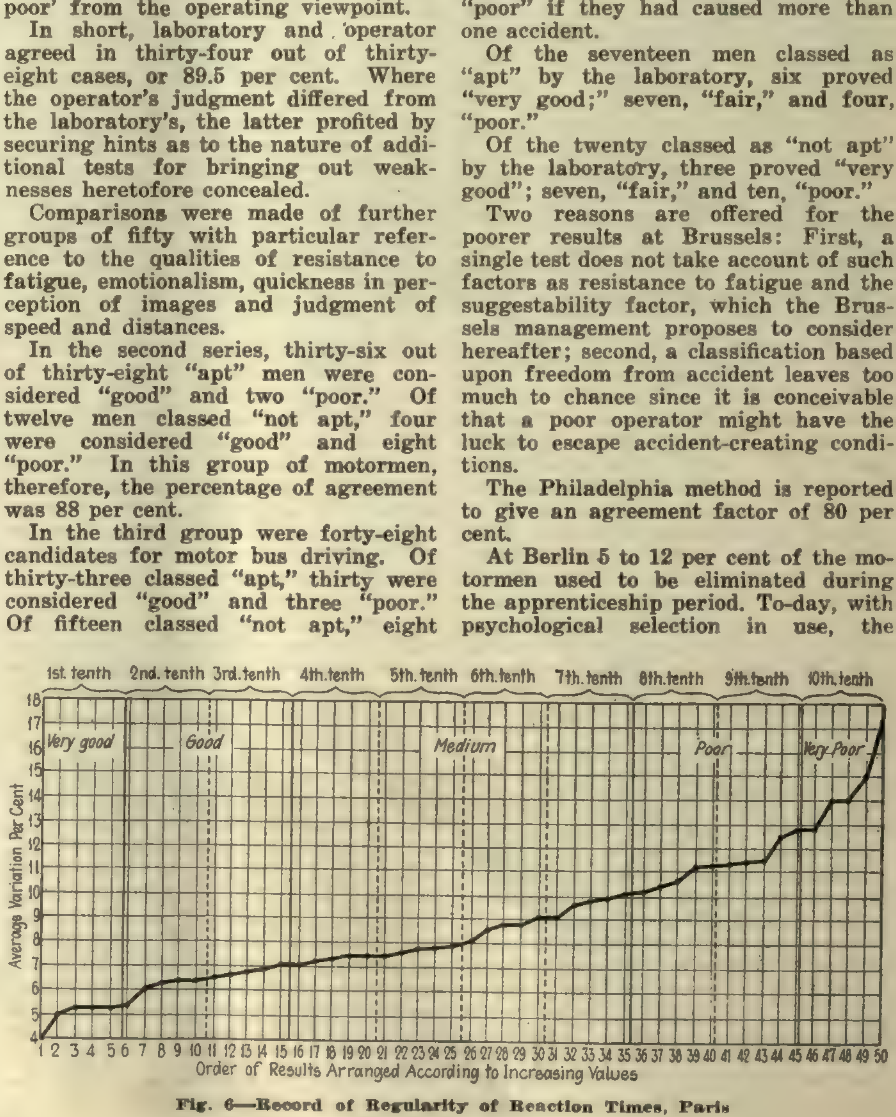

Fig. 6—Record of Regularity of Reaction Times, Paris

elimination figure has dropped to 0.13 per cent. Furthermore, the period of apprenticeship is but 66 per cent as long as before while accidents have been reduced 45 per cent. [The basis on which accident reduction was figured is not given in the paper, and possibly the gain is exaggerated because of the less mileage run in Berlin during 1922 and 1923.—EDS.]

LOW COST AND LITTLE TROUBLE TO FIND CANDIDATES

The foregoing review of psychology applied to selection of platform men shows that while there is yet much to learn, enough is known to be of great helpfulness today. Development along these lines should be encouraged as much as possible to the end that still greater gain may come.

The question has often been asked whether the laboratory tests are not so severe as to cause a shortage of applicants for positions. In Paris and on other Continental systems, this is not observable because drivers are taken from the staff of conductors whose ability in certain directions has already been demonstrated in operation. Hence the psycho-technical tests are intended less for the elimination of the unfit than to fit each man to the type of job he can do best.

Before the days of laboratory tests, also, about 15 per cent of motormen candidates and 23 per cent of chauffeur candidates failed to make good during their apprenticeship. The percentages of rejection in laboratory tests (which precede all the time and cost of apprenticeship) is somewhat higher but appears largely justified in the better grade of men obtained. The selection of better men is not the only advantage of the psycho-technical examination because these men learn faster and more thoroughly.

Following the experience with one installation at the laboratory, the Paris company is installing at every school for motormen a combination of platform apparatus and recording devices which reveal improper operation of control and braking appliances to such a degree that it is possible to follow the progress of each pupil in correct manipulation.

There is the final question: "What does this laboratory work cost?" While it may not be possible for smaller railways to use these methods, there is no doubt that they should be used by the bigger systems because the unit cost is low. At Paris this cost, exclusive of amortization of the laboratory equipment, amounts to 30 francs (say $1.50) for an examination of 90 minutes. To judge whether this is worth while, consider some of the costs with which the Paris system has to deal:

First—The laboratory tests have eliminated 85 per cent of the 650 candidates a year formerly rejected in the course of apprenticeship after an average of seven days' training. This means an approximate saving of 3,850 man-days or about 130,000 francs ($6,500). Considering a reduction of 20 per cent in the duration of the training period on account of the greater uniformity of the students and absence of the unfit, there is a further saving of 12,000 man-days with 400,000 francs ($20,000).

Second—It is permissible to figure that with a more select class of vehicle operators there will be substantial reductions in the 4,000,000 francs ($200,000) annual accident costs due to these employees; in the 57,000,000 francs ($2,850,000) power and fuel charges, and in the 58,000,000 francs ($2,900,000) rolling stock maintenance.

Obviously, a very small percentage of reduction in such costs as these would pay for the laboratory tests many times over.

Thanks are due to the many psychologists and physiologists of various Paris institutions for their advice and their facilities.

THE QUESTIONS OF RE-EXAMINATIONS AND ALCOHOLISM

Most electric railway systems have the rule that platform employees ill for more than three months have to pass a special examination before they are allowed to return to service. In some instances motormen or bus drivers are subjected to a like examination following an accident for which they have been judged responsible. In the engagement of employees, those systems which have a pension system generally also insist upon a thorough examination before putting a man to work.

Of twenty-one companies which responded to the question in the data sheet as to whether they held periodic re-examinations of veteran employees, eight replied that they considered such examinations needless. It is noted, however, that in most cases these were small roads whose managers are probably individually well acquainted with the employees under their direction. The re-examinations conducted by the other undertakings varied as to interval but averaged every three to five years except that some conducted no re-examination until a man was more than 45 years old.

The practice of Paris is to re-examine motormen and bus drivers at intervals of 5 years up to the age of 45 years, at intervals of 3 years between the ages of 45 to 54 years, and every year thereafter. The acuteness of hearing and vision are the essential points in these re-examinations, supplemented by a general medical examination, if necessary.

Psycho-technical tests are still too new to be applied to veteran employees, but a number of the systems reported that they planned to make such tests in future. The Paris re-examinations of men considered responsible for accidents have shown in some cases the need for the tests of judgment of speed and distance, and in other cases that some recent mind or heart (psychiatric or cardiac) trouble was the cause. As a rule, men who can no longer meet the requirements for the front platform are given work on the rear platform where good physical condition is of less importance.

Outside of such cases of alcoholism as are revealed in medical examinations, Continental roads do not seem to follow any other procedure other than reports made by inspectors on employees given to excessive drinking. It seems that alcoholism has been reduced since the World War because of the high price of liquor. At any rate, the managements punish severely, even to discharge, any employee found drunk or reported to be in an intoxicated condition while in service.

Some managements go farther than this and forbid platform employees to visit saloons during working hours and others supplement this rule by furnishing soft drinks without charge, including some hot drink in the early hours of winter days. Low-price restaurants are conducted by some properties and are found of value in keeping the men from temptation. On the Paris system, secret service men circulate in drinking places. Employees found in them are warned by letter. The Paris management believes, also, that its periodical examinations are of value in restraining alcoholic excess.

Finally, welfare activities such as the formation of music, athletic and arts clubs are encouraged as a means of keeping the men out of trouble during their off-hours.

Restoring Public Confidence in the Railways*

BY R. B. STEARNS
Vice President and General Manager
Eastern Massachusetts Street Railway

THE fact that the electric railway industry is confronted today with a discussion of whether or not street cars are going out of business, is more or less an indictment of its policy in failing to take the lead. The industry is not going out of existence. It is just getting ready for business on a more extensive basis, and needs only more confidence and support from the public and less fear of decadence. There is no reason why the street railways should not, under proper regulation, continue the business of local transportation and furnish all the local service, whether by the present street cars on rails or by buses and taxicabs.

The Eastern Massachusetts Street Railway is a striking example of what has taken place in the industry in the way of restoring property to its proper usefulness since it crumbled and broke during the war period. One of the first things done under the service-at-cost principle of the public control act was to establish a flat 10-cent fare. The property was divided into separate districts so that when cost in the districts could be determined and conditions warranted, fares could be charged in accordance with the cost of transportation in that district. The organization was put on a divisional basis. The theory of this was that car riders were concerned only with transportation costs and problems in their immediate district and had long felt that they were abused through being required to bear costs in other territories in which they had no interest.

Results have demonstrated that this theory was sound and that it has done much to establish public confidence in the street railway. Every possible operating economy was put into effect including operation of one-man cars, ultimately to the extent of 96 per cent of all service, adjustment of service by local supervisory organizations and the most economical maintenance of roadway and equipment. These and other economies have made it possible from time to time to reduce fares in the various districts so that at the present time, while the basic 10-cent cash fare has been maintained, by the use of reduced rate tickets here and there, the weighted average fare is 6.89 cents.

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*Abstract of a paper presented at the eleventh annual conference of the Babson Organization, Babson Park, Mass., Aug. 8, 1924.

Moreover, in the year 1923, the company earned its interest on the investment.

In our case it was discovered that nothing succeeds like success. Just as soon as we turned the balance slightly in our favor, then those who were most pronounced in their outcries acknowledged that there was nothing else we could have done to save the street railway industry, and that our positive stand assured the preservation of the only reliable transportation needed in the community. At present the overwhelming majority of the people are favorably impressed by the disappearance of the jitneys and the rehabilitation of the street railway property, the introduction of new cars and the general all-around improvement in operation. A minority, of course, continues to howl loudly.

Every street railway should promptly put its property in condition to render the best and most practical service to the public consistent with the maintenance of a sound financial condition, to bring about the restoration of credit and to command the respect and support of the public. There is evidence to show that this is being done in a courageous manner throughout the country.

West Virginia Utilities Convention in November

THE annual convention of the West Virginia Public Utilities Association will be held in Charleston, Nov. 14 and 15. The date of the annual meeting was put off until after the general election. In addition the members of the association will have opportunity to attend the West Virginia-Washington & Lee football game, Nov. 15.

Central Traffic Association Meeting

THE next regular meeting of the Central Electric Traffic Association will be held at Yellow Banks Hotel, Webster Lake, Ind. on Sept. 12 and 13. This meeting will consist of a round table discussion, meetings of committees, committee reports and such other business as may be properly presented.

Badger Railway Men Meet at Madison

Practical Discussion of Operating Problems Features Summer Meeting of Railway Section of Wisconsin Utility Association —Benefit Organizations, Group Insurance and Pension Plans Also Considered

FOLLOWING a day of interesting entertainment, the railway section of the Wisconsin Utility Association devoted the second morning to a discussion of ways of improving track construction, car maintenance, and reducing labor turn over. In addition to these general discussions papers were presented on storeroom practice and accident prevention.

The activities of the first day included a trip through the Capitol building, an inspection of the university and other points of interest, and a boat ride on Lake Mendota. A dinner dance was held in the ballroom of the New Hotel Lorraine that evening. Dudley Montgomery, vice-president and general manager Madison Railways, chairman of the section, opened the meeting on Friday with an address welcoming the 120 railway men and manufacturers' representatives. He referred to the improvements in the financial and physical condition of the industry, and pointed out the recent successful sales of electric railway securities to passengers as examples of the return of public confidence in the business. During the year there has been a steady growing public consciousness that street cars are a vital part of city life. In substantiating this statement he cited the results of attempted bus operation in Saginaw, Akron, Toledo, Bridgeport and Des Moines. However, he stated that buses have an important place in the transportation field in connection with city and interurban service in sparsely settled districts where it would be too expensive to extend and maintain railway service.

"Accidents, Their Causes and Prevention," was the subject of a paper read by J. I. Searles, railway superintendent at Ironwood, Mich., of the Lake Superior District Power Company. Stating that fully 99 per cent of all so-called accidents are caused by carelessness of some one's part, he enumerated the ways by which his company first reduced accidents for which it was responsible, and then minimized the automobile accidents. A bonus plan was inaugurated giving to each car operator a cash award of $50 for every twelve months of operation without an avoidable accident. The plan also stipulates that for the first avoidable accident, the operator is penalized $5, for the second he is given a rate reduction of 4½ cents per hour for a month, and for the third he is discharged. The method has improved conditions to such an extent that during the existence of the plan only two men have been penalized. According to Mr. Searles the communities through which his property operates, experienced 45 automobile accidents during a period of twenty days, while for a period of 45 days the street cars operated 65,000 car-miles, without one accident. He attributes this record to the fact that all car operators are taught to assume that every automobile driver is deaf, dumb, blind and drunk. The latter condition is quite prevalent in his territory, stated Mr. Searles and is the cause of many accidents. One method of combating this accident danger is by working in close co-operation with the police department and causing the arrest and fine of any person found driving while intoxicated. Another method along which has proved successful is to have car operators report daily the persons seen driving carelessly. A letter is written to these persons giving the time, place and nature of the driving and indicating to them their responsibility in the matter. Should such a person later become involved in an accident with the railway, it would be his second offense and prosecution relatively simple. In conclusion Mr. Searles said that only through co-operation with the motorists will streets be free from accidents.

An interesting description of modern store-room methods was given by W. G. Barnett, storekeeper of the Chicago, North Shore & Milwaukee Railroad. In the discussion which followed several manufacturers' representatives asked for closer co-operation between the stores department and the manufacturer in order that purchased material might be delivered before the store-room stock was exhausted.

In connection with the labor question, J. C. Schade, manager of railways, Wisconsin Public Service Corporation, presented a concise paper dealing with methods employed to reduce turnover.

Bridges, ships, houses, machines, in fact anything made by men can be moulded into exact duplication, but among the millions and millions of men on the earth there are no two alike, and therefore no set formula would be entirely practical in selecting men and welding them into working units. The selection of men is not so important as proper handling after the selection is made.

A man may be the finest mechanic in his line and his selection may be prompted because of his skill, but if he does not fit in with the general scheme of things his workmanship comes to naught. On the other hand if his skill is not recognized and given proper credit he rightfully falls into the ranks of discontent and his efficiency is impaired. Many a man has been forced into the "work, eat and sleep" habit because his initiative has been curbed by an over ambitious immediate superior.

Contentment is the best preventative for commercial unrest, and contentment comes to any man when he knows that his efforts and ability are recognized. The most dangerous misfits are men placed in executive positions who will not recognize the human side. There is a human side to every man's makeup which must be recognized if we expect to keep harmony. This does not mean that we must be sentimental or permit tradition to interfere with new methods or practice, but we should try to reach a happy medium as between the man, his ability, and his general make-up.

Discussing the subject, R. M. Howard, Winona, Minn., explained how his property treated the new man with tolerance, placing him temporarily on probation during which period he was encouraged to become thrifty and keep his mind on his work. The old employees are well taken care of on his property, he said. Three types of employee beneficial work is performed on the North Shore Line, according to B. W. Arnold, the men belonging to an employees' benefit association, sharing in a pension system during old age, and their heirs receiving insurance money through group insurance policies. Mr. Arnold spoke very highly of group insurance as a means of relieving the man's mind while working. Labor turnover will be a minimum if the men feel right toward the officials and have affection for the men at the head of the company, was the concluding statement by Mr. Arnold. Additional discussion by A. J. Goedjen, Menominee, and Nels Rasmussen, Green Bay, commended group insurance and pension plans as means to reduce discontent among employees.

Many practical points about track and paving construction and maintenance were given in papers read by A. A. Oldfield, Fond du Lac, and Clyde L. Hedges, La Crosse, which opened the general discussion of the subject. Both speakers gave specific examples of construction and maintenance methods as practised by their companies. Mr. Oldfield predicted that all new track construction would be of the solid type in order to withstand the heavy vehicular traffic. Manganese switches and crossings are now used as standard by his company. Mr. Hedges explained the various methods of track construction with Dayton resilient ties, using brick and concrete pavement. The discussion which followed was confined to specific examples of construction work carried on by the companies represented.

Believing that too much stress has been put on advantages of light weight interurban cars, E. M. Lunda, Green Bay, pointed out the dangers of going to an extreme in building cars for interurban service that were too light. His paper dealing with "Safety Car Operation and Maintenance" contained many practical maintenance kinks for this type of equipment. The methods employed for periodic inspection of the various details of the car were given by Mr. Lunda.

Maintenance of electrical equipment of cars was the subject which was discussed freely by the mechanical men present. The first paper by Nels Jensen, Wausau, summarized the work performed along these lines on his property. According to Mr. Jensen the worst enemy of electrical equipment is dirt. Consequently the matter of maintenance is fundamentally a question of cleanliness. Methods of protecting the equipment from dirt and removing it, were the outstanding points of Mr. Jensen's paper. E. F. Hara, of Oshkosh, followed with a paper setting forth the methods employed by him in inspecting motors, controllers and other electrical equipment. Inspection of city cars is on a 1,000-mile basis, at which time the motors, brush-holder insulators, and controller fingers are cleaned up. The air compressor is cleaned, inspected and oiled. Interurban cars are inspected on a 1,400-mile basis, while 70,000 miles of service is used as a base for complete overhauling. According to Mr. Hara, systematic replacing of worn electrical parts is the secret of successful operation. A paper on this same subject presented by Henry Cordell of Highwood, Ill., concluded the business session. Mr. Cordell's paper will appear in a later issue.

The last item on the program was a talk by J. W. Colton, editor of *Aera*, summarizing the achievements of the electric railway industry. Among some of the pertinent facts brought out during the talk, Mr. Colton said: "Progressive railway men recognize that the bus has a place in transportation and that place is as a supplement or auxiliary to the rail lines. More than 150 electric railway companies are operating more than 1,600 buses, and at least 400 more are on order. With the public informed about the industry, about the costs of electric railway operation, the costs of bus operation, the effects of unfair competition, the effects of unjust and burdensome taxes, it should not be long before even the most skeptical will be convinced that the electric railway is a permanent institution."

American Association News

Entertainment

A MEETING of the entertainment committee of the American Association was held at Association headquarters, New York City, on Aug. 20 to consider the entertainment features of the program for the Atlantic City convention next October.

Details of the various features arranged were reported on by the various sub-committee chairmen. Mr. Dewhurst outlined the proposed program for the entertainment of the ladies attending the convention. On Monday afternoon there will be obstacle golf on the course of the Marlborough-Blenheim. Tuesday afternoon arrangements are being made for cards at one of the hotels. Wednesday afternoon it is planned to have a concert featuring an opera singer. Thurday afternoon there will be a motor trip.

For general entertainment it is planned to hold an informal dance Monday evening. Tuesday evening's entertainment has not been decided definitely, pending the decision of the meetings and subjects committee as to whether a formal address will be given by some speaker of national prominence. It is planned that in the event there is no speaker assigned for that evening a special entertainment will be provided by Mr. Cotsworth's committee.

The plan for the Wednesday evening feature, "Play Night," was outlined by Mr. Hale. This will be a novel event which will provide amusement and excitement for all, the exact nature of which will be reserved for the present. It will be entirely different from the attractions which have featured previous conventions.

Considerable discussion took place regarding the grand ball to be held Thursday night. Mr. Palmer desired to keep the ball formal in order to make it different and distinct from the informal dances held at various times during the convention. It was decided to have suitable dance programs prepared for the ball.

Those present at the meeting were F. H. Gale, chairman; J. V. Sullivan, vice-chairman; F. L. Butler, Frank Killian, J. A. Dewhurst, L. H. Palmer, M. A. Oberlander, S. J. Cotsworth, G. R. Rowland, A. A. Hale, L. W. Shugg, Morris Buck representing Harry L. Brown, and G. C. Hecker and F. C. J. Dell of Association headquarters.

Transportation and Traffic Executive Committee

THE meeting of the executive committee of the Transportation and Traffic Association was held at Association Headquarters, New York City, Aug. 19. Those in attendance were President J. K. Punderford, chairman, T. C. Cherry, J. V. Sullivan, Edward Dana and W. H. Boyce. G. C. Hecker acted as secretary of the meeting.

The minutes of the previous meeting held in St. Louis on March 3 were read and approved with minor modifications.

The various committee reports were then taken up and discussed and the following committee reports were read and approved for printing, with a few modifications: Accident prevention; Development of New Business; Relief of Traffic Congestion; Trackless Vehicle Operation.

The lists of those invited to discuss the various committee reports were reviewed and several additional men suggested. The secretary was instructed to issue invitations to those suggested for taking part in the discussion and obtain their consent as early as possible.

The committee reviewed the preliminary convention program and approved it including the suggestion made by Mr. St. Clair that the advertising and publicity symposium be placed ahead of the report of the committee on trackless vehicle operation.

Mr. Punderford announced the appointment of a committee on subjects for next year.

The committee discussed the policy in regard to the approval of committee reports in the future. It was suggested that hereafter each committee chairman prepare a sufficient number of typewritten copies of his report and supply a copy to each member of the executive committee as early as possible after July 1. It was the sense of the committee that a meeting of the executive committee should then be called and invitations extended to each committee chairman to be present at the meeting and take part in the discussion of the reports. When the reports were approved by the executive committee they would then be turned over to the secretary for publication.

The next meeting of the executive committee will be held in Atlantic City, Oct. 6 at 11 o'clock.

Maintenance of Equipment

Gaging Trolley Wire by Schedule

By G. H. McKelway
Engineer of Distribution, Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

MANY railway companies measure the diameter of the trolley wire either at the ears or in the middle of the sections, and from the results of such measurements decide when and how much of the trolley wire to renew. This method gives an accurate record of the condition of the wire, but if the frequency of the inspection is not specified some lines will receive more examinations than they really need, while others will not be gaged often enough.

Except where there are heavy grades or other unusual conditions to cause the copper to soften or be burned away, the wear on the wire is roughly proportional to the number of cars passing under it. The headway of cars may thus assist in determining the necessary frequency of gaging. Where more than one line uses the same street the headways of the lines should be combined.

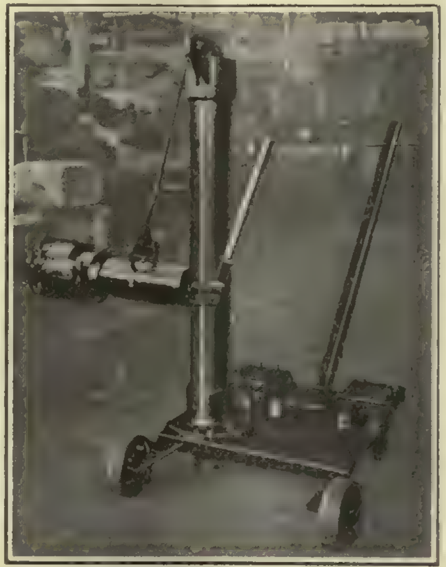
Our practice is to divide inspection into four groups. Some sections are gaged every six months, some every twelve months, others with light service are gaged every eighteen months; and where the service is still lighter every two years.

To make sure that this plan is followed carefully a complete schedule is prepared showing when each line should be gaged during a two-year period. Each monthly heading gives the names of the streets, on which the wire is to be measured during that month. A sufficient number of lines are given to keep the men busy, and yet not to give them more work than they can handle during that month. Where cars are turned back on a long line so that there is not the same amount of traffic over all parts of it, or where other lines turn into the same street, the line is divided into two or more sections and these sections are measured at different intervals.

This plan has worked out well in practice, has prevented the measurement of wire at too frequent intervals, has kept the number of trolley breaks down, and has made certain the gaging of some outlying and unimportant lines which were sometimes overlooked, under previous methods.

Handy Mounting for Pinion Pullers

IN THE shops of the Department of Street Railways, city of Detroit, the Woods pinion puller used in the armature room is mounted on a portable "buggy" in the convenient manner shown in the accompanying illustration. An upright hollow pillar is securely bolted to the framing of the "buggy" and has mounted at its upper end a set of pulleys over which the flexible cable supporting the pinion puller operates. On the interior of the column a counterweight balances the puller so that it can be readily handled in any position. In addition to facilitating the work of moving the pinion puller from place to place about the armature shop, the arrangement also has an additional advantage from the standpoint of safety. There is sometimes a tendency for the puller to jump away from the armature when a particularly tight pinion suddenly comes loose. With the support illustrated, the puller is confined by the cable and prevented from rebounding any great distance.



Portable Pinion Puller Used at Detroit

Pipe Supply Kept on Racks

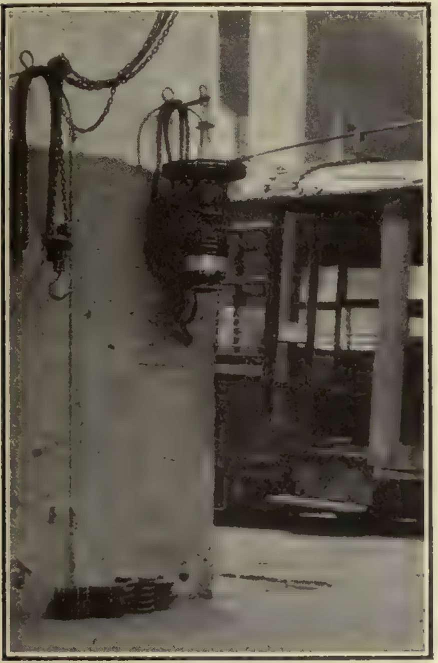
NEATNESS in the appearance of the pump room at the shops of the Illinois Traction System has been accomplished by racking all pipe in an adjacent room. This room was formerly a passageway from the outside to a stairway leading to the second floor. An opening was made into the pump room and the pipe rack mounted on the wall alongside the door which leads to the outside yard. This location enables long lengths to be placed and removed through this door.

The rack consists of four sets of supports or arms spaced 3 ft. apart, arranged for holding nine tiers of pipe. Large 2½-in. pipe is placed at the bottom and small ¼-in. pipe at the top. Supports are riveted to a 2-in. x ½-in. piece of steel which extends from the floor to the ceiling and is securely fastened to the brick wall. They are made up of 1½-in. x ½-in. steel and vary in size and spacing. The largest support is 12 in. long with a leg at the end 3 in. high, and is spaced 12 in. below the next one above. The smallest is 4 in. long with a leg 1½ in. high and is spaced 6 in. above the next one below. Between these two extremes are seven other supports of proportionate sizes and spacings. The rack was built in the shop and has proved a time and labor saver.

Pipe Racks Installed by Illinois Traction System at Decatur Save Time and Improve the Appearance of the Shop

Spare Armatures Hung in Handy Location

A RATHER unusual degree of standardization in rolling stock has been accomplished by the Bangor Railway & Electric Company, Bangor, Me. This company is said to be the first railway in New England to adopt the Birney safety car, and since the original installation nothing but safety cars have been purchased. At the present time the equipment consists almost entirely of cars of this type, both single truck and double truck, and this has resulted in reducing the number of spare armatures which it is necessary to keep on hand. Spare armatures are suspended vertically from brackets on the wall of the carhouse, as shown in the accompanying illustration. A round iron horizontal rod has been driven into the wall. On the outer end of this is a simple hook which grasps the armature by the pinion. This method of storage is feasible on account of the light weight of these armatures.



Vertical Suspension of Spare Armature in the Shops of the Bangor Railway & Electric Company

Gas Cutting Equipment on Wrecking Truck

THE clearing up of a wreck can often be carried out more quickly if gas cutting equipment is used. The Pacific Gas & Electric Company, Sacramento, Calif., has added a portable oxyacetylene cutting outfit to its wrecking equipment carried on a truck. The cutting equipment is inclosed in a metal case about 2 ft. high and 18 in. square. It is arranged so that two men can carry it readily. A cylinder of commercial oxygen and one of acetylene gas are carried in this case equipped with the necessary gages and 25 ft. of tubing. The torch cuts ½-in. boiler plate at the rate of a foot a minute. The total capacity of the tanks is sufficient for operating the torch 7 hours.

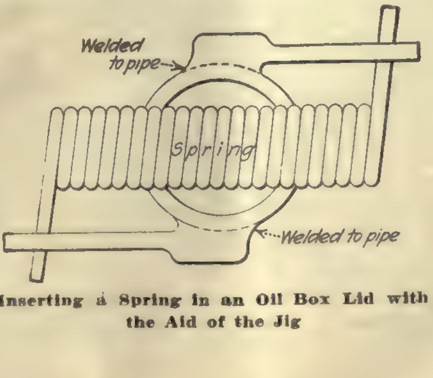
Movable Scaffold for Painting Shop Interior

FOR convenience in painting the inside of its Harmon shops the New York Central Railroad is constructing a scaffolding mounted on a flat car. This scaffolding is in the form of a tower with a top section which can be raised and lowered. With the tower in its down position, clearance is provided underneath the lowest parts of the shop. At lighting bays where the height is greatest, the top extension is raised. Side extensions are also provided so that the sections of the structure which come in between the tracks can be reached readily by workmen. The painting is to be done by the spray painting method.

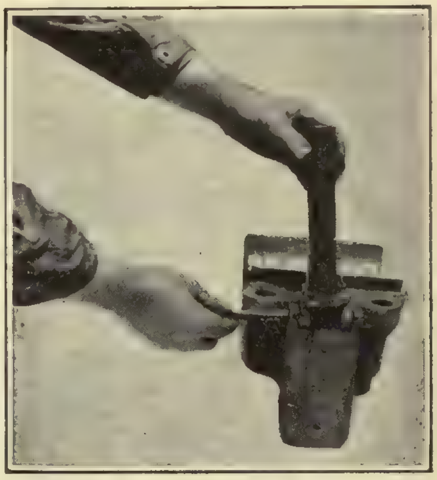
Tool Helps to Insert Springs

WHEN it is necessary to insert new coiled springs for the covers of various forms of oil boxes used on electric railway cars, the job is usually done with the aid of a screw driver, or other hand tool, and the spring is put into place after considerable effort.

In the shops of the Omaha & Council Bluffs Street Railway, the simple jig shown in the accompanying illustrations has been found extremely handy for this work. It is a home-made device which consists of a piece of pipe having two lugs or hooks welded at one end. These hooks project out from opposite sides of the pipe, so that the spring can be inserted between them.



Inserting a Spring in an Oil Box Lid with the Aid of the Jig



End View of the Jig Showing How a Spring Is Held

Thus the spring is wound to any desired tension, slipped between the lugs so that the ends of the spring are held, and when the bolt or pin in the box cover is put in place the jig is withdrawn and the spring remains in position with the desired tension. The accompanying sketch shows a view of the end of the jig, illustrating the manner of holding the spring.

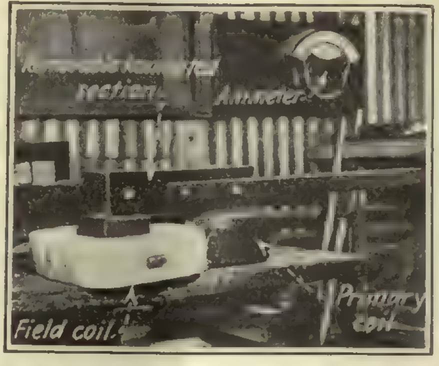
Testing Field Coils

NEWLY wound motor field coils are tested at the Decatur shops of the Illinois Traction System by means of an induction tester shown in the accompanying illustration. This apparatus is in effect a core type transformer, of which the field to be tested is the secondary and a special exciting coil the primary. The primary coil is permanently mounted on one leg of a laminated iron core, while the field coil under test is slipped loosely over the other leg of the core. Alternating current at 110 volts, 25 cycles, is supplied to the exciting coil, which induces an electro-motive force in the coil under test.

In operation the field coil to be tested is slipped over the free leg of the core, and the magnetic circuit is closed by replacing the upper section of the core, which is hinged and is readily removed. Current is then turned on in the primary. If there is a short circuit in the field coil under test, the ammeter connected in series with the primary coil will indicate an excess current above that normally required for magnetizing the iron. This latter reading is constant under all conditions, and is known beforehand. It represents the current necessary for cutting up the magnetic flux and supplying core losses in the iron and heat losses in the primary coil.

The entire apparatus is mounted on the work bench so that the lower leg of the core is beneath the surface of the bench. This allows the coil under test to lie flat on the bench. The distance between the two vertical legs of the core is approximately 18 in., so that plenty of room is allowed for slipping any ordinary field coil over the pole. The laminated core is made of No. 24 gage soft steel 4 in. wide, and built up until the core is 4 in. thick. Enough wire is wound on the exciting coil to give a rating of approximately 10 amp. on the a.c. ammeter when the core is closed and a perfect field coil is inserted for test.

As this company builds all of its own field coils for various types of motors, this apparatus has proved a big asset in accurate testing of these coils and has prevented failures in service.



Motor Field Coils Are Tested at the Decatur Shops of the Illinois Traction System by This Induction Apparatus

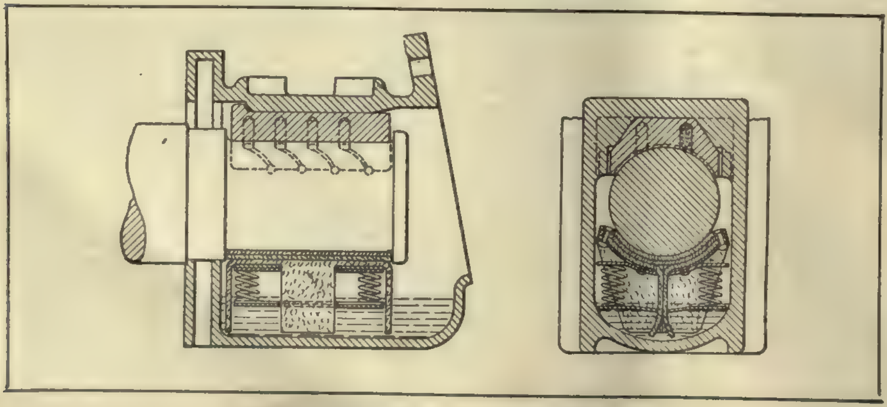
New Equipment Available

Journal Box Lubricating Device

A RECENT development in truck journal lubrication called the Phee system which has been tried in Boston and Milwaukee, is being marketed by the Froedtert Equipment Corporation, Milwaukee, Wis. Initial tests of this device were made on the surface cars in Boston. A car of the Milwaukee Electric Railway & Light Company has been operating with this device since March 17, 1924. A total mileage of slightly more than 12,000 has been made since the device was installed. At that time 1.7 qt. of free lubricating oil was placed in each journal box, and no additional oil has been added since then. This car has 4½ in. by 8 in. journals.

As shown in the accompanying diagram, a metal plate rests on the bottom of the journal box and supports the upper portion of the device by means of six springs. The upper portion has two metal plates which in turn support three layers of wool felt ⅜ in. thick. The bottom layer of felt projects at each end sufficiently to drop down to the bottom of the box and two additional strips of felt project downward to the bottom of the box through the center of the metal plate. The top two layers of felt are 1 in. shorter than the journal bearing surface to allow for lateral movement, thus the layers of felt when in position are held in contact with the bearing surface by means of springs. In addition, the brass, which is of the standard type, has a series of holes of ⅜ in. diameter and ⅝ in. depth drilled along each side and connected by channels ⅛ in. deep.

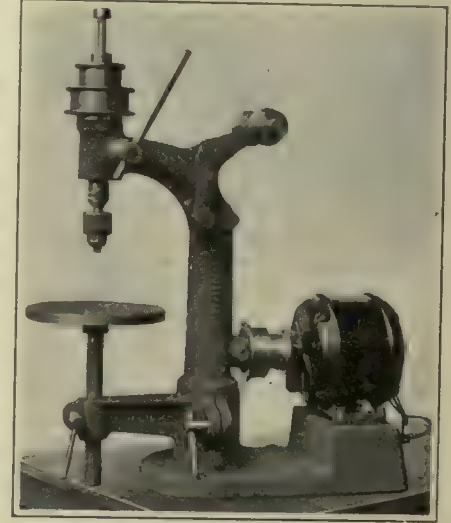
Oil is fed to the bearing surface by the pad remaining in contact with the journal. Additional oil is fed to the pad as required by the four wicks which dip into the free oil at the bottom of the box. These wicks serve not only to feed the oil but also to filter it as it passes up and to act as a guard at each end for preventing foreign matter from coming in contact with the bearing surface. The purpose of grooving and drilling the brass is mainly to insure a plentiful supply of free oil to the bearing surface during the time required to wear the brass to a bearing seat.



Details of Journal Box Lubricating Device

Improved Bench Drill

AN IMPROVEMENT has been made in the 10-in. Junior motor-driven drill manufactured by the Buffalo Forge Company, Buffalo, N. Y. In the older design a pinion and gear were employed which made operation noisy. The new method of drive is through a belt with pulleys keyed to the shaft of a ¼-hp., 1,750-r.p.m. motor. This makes a quiet positive power transmission and saves space. The spindle runs in a large bronze bushing, and is provided with a No. 2-A Jacobs chuck. There are two speeds. Shifting from one speed to the other is accomplished without using any tools, as the idler works with a snap socket. This eliminates the use of set screws.



Motor-Driven Bench Drill

This is the smallest power drill manufactured by this company. It has a substantial cast-iron frame and a finished round table movable in both horizontal and vertical positions. The normal driving speed is 550 r.p.m., although it can be driven as high as 3,000 r.p.m. and still remain in perfect balance. The height of drill is 27½ in. and it will drill holes up to ⅜ in.

The News of the Industry

Mr. Hedley Talks Buses

Subway Head Opposed to Lines Other than Those Designed to Be Run as Feeders

Frank Hedley, president and general manager of the Interborough Rapid Transit Company, New York, said on Aug. 21 that the company would oppose any independent bus system not connected with and feeding the city-owned subway system operated by his company.

His remarks were prompted by a proposal which had been made the day before by the Fifth Avenue Coach Company to establish 35 new bus lines in New York City, comprising 116 miles of route. The crosstown lines would operate on a 5-cent fare and the trunk lines on a 10-cent fare. The city would get 2 per cent of the gross income. It would have the privilege of recapture under arrangements to be made later, but suggested tentatively by the Fifth Avenue Coach Company in the form of two alternative plans.

Mr. Hedley's statement followed quickly upon the announcement of the withdrawal of himself and Vice-President W. Leon Pepperman from the directorate of the bus concern. Frederic T. Wood, president and general manager of the Fifth Avenue Coach Company, has likewise withdrawn from the directorate of the Interborough and the two corporations now apparently stand completely severed.

In this connection Mr. Hedley explained that the Interborough Rapid Transit Company is not interested in an omnibus company and never has been so interested. The stock of the Interborough Rapid Transit Company ten years ago was almost entirely in the treasury of the Interborough-Metropolitan Company. At that time the same company had a little less than one-half of the shares of the company owning the Fifth Avenue Coach Company. That investment at that time represented only about one-third of 1 per cent of the investment of the Interborough-Metropolitan system. Since then the Interborough Consolidated Corporation (successor to the Interborough-Metropolitan Company) has gone into bankruptcy and its investment in the omnibus business in New York was distributed among the creditors of the company.

In regard to the merits of the matter, it struck Mr. Hedley that the bus proposal was a repetition of efforts which were made by Chicago interests about ten years ago, when applications were made for routes not much unlike the present routes. He says that at that time after hearings extending through many months, the policy of the city was definitely laid down against further franchises for bus operation. Since then temporary permits, or short-time franchises, only have been granted by the authorities.

Mr. Hedley said in part:

> At the hearing ten years ago the Interborough's position was stated, and that was that it was not advisable to grant further franchises. The Interborough Company did not then, nor does it now, take any "dog-in-the-manger policy." It is ready today to co-operate with the public authorities to arrange for the bus operation in such localities as may be necessary to serve the public in connection with the city-owned subways.
>
> About thirty years ago the City of New York embarked upon a policy of putting transportation underground to prevent the even then increasing congestion in the city's streets.
>
> Ten years ago, at the hearings mentioned statistics were laid before the city authorities of the terrible accidents in the streets of London and Paris and the intolerable congestion of traffic movement due to the omnibus operation in those cities. It was found in London that the omnibus was ruining the transportation lines owned by the City of London. The Underground Companies, as they are called in London, had to buy them in order to get them rerouted to avoid unfair and ruinous competition and to relieve street traffic congestion.
>
> It was stated to the city authorities ten years ago, on behalf of the Interborough: "We are not in the market to buy anything from anybody. We might just as well be understood now. If anybody gets a franchise, the Interborough is not going to be in the market as the London Underground was to take it up. We will stand the competition first."
>
> That is the position of the Interborough Rapid Transit Company today.

Mr. Hedley did say, however, that the business of the Interborough Rapid Transit Company is solely that of furnishing transportation to the people of New York. It is his idea that with present city-owned subway, with extensions wherever bus operation may be necessary, the needs of the people of New York can be met better by bus routes connected with the subway than by any separate service.

Right of Utility to Advertise Affirmed

The Connecticut State Public Utilities Commission has denied the petition in which the Mayor of Stamford objected to the Stamford Gas & Electric Company's advertising on the ground that the cost of such advertising should be used to reduce the cost of gas to the consumer. It was shown by the company at the hearing that the amounts thus expended were so small that no benefit would accrue to the consumer should the policy of advertising be abandoned. The commission said:

> The experience and observation of this commission has been that frequently complaints by patrons in matters relating to utilities are due to the omission of the utility to provide intelligent information. This commission has always advocated a proper amount of publicity on the part of the utilities companies in order that their patrons may be informed, in a general way, as to operating and financial conditions as affecting the rate payers. A fair and frank statement by the utility on controversial questions will assist in maintaining a relationship of good will and co-operation between the company and its patrons.

Proposes Loop Use

Cincinnati & Dayton Wants to Bring Its Cars Into Cincinnati—Solution of Loop Problem Advanced

A proposition to make immediate use of the Cincinnati, Ohio, rapid transit loop has been presented to the Rapid Transit Commission by Judge Wade Cushing, Presiding Judge of the Court of Appeals. His letter sets forth a proposal made by the Cincinnati & Dayton Traction Company seeking the right to use the loop from its traction terminal, so as to bring its cars down to the subway station at the Canal Boulevard and Vine Street.

Judge Cushing explained that the Cincinnati & Dayton was in the hands of George Sohngen, Hamilton, as receiver, and that Mr. Sohngen wrote to the court recently, stating that it would be a great advantage if the company could use the loop to bring its cars into the heart of Cincinnati.

The court saw in this an opportunity for the Rapid Transit Commission and the city to solve immediately a part of the problem of what eventually is to be done with the loop, and referred the matter to the Rapid Transit Commission.

From the explanation set forth by Judge Cushing, it will be seen that the Cincinnati & Dayton Traction Company contemplates an elevated line from a point west of the Baltimore & Ohio Railroad tracks to reach the loop, thereby doing away with the grade crossing of the railroad at Spring Grove Avenue.

The Cincinnati & Dayton Traction Company controls and operates the traction line between Spring Grove Avenue and Dayton and also the electric railway system in Hamilton. In 1920 a case was tried in the Court of Common Pleas of Butler County involving the foreclosure of numerous mortgages on the property, their sale and a distribution of the money received from such sale. The case was appealed to the Court of Appeals on Jan. 3, 1923. The appeal brought with it the receiver appointed by the court below and imposed the duty of managing the property until distribution. The receiver has greatly improved the physical condition of the interurban properties under his control as well as the Hamilton city lines. The business of the road has been such that whereas it previously showed a loss of about $60,000 a year it now shows a profit of from $60,000 to $75,000 a year.

Mr. Schngen also contemplates putting on two and three-car limited trains between Cincinnati and Dayton. One of these cars will be a chair car. He estimates that such service would greatly increase the travel on the road.

Community Life Altered

Los Angeles, Compelled to Cut Use of Current, Fully Realizes Value of Utility Services

Out where the West begins and ends —Los Angeles, of course—small boys are breathlessly awaiting an official ban on the use of water for bathing purposes, with special restrictions on washing neck and ears. They crave to lend their help in the water shortage crisis which confronts southern California.

It's a good water shortage, as water shortages go. Los Angeles believes in doing things in a superlative fashion, and the water shortage is handsomely accomplished. More lives are affected, more property endangered, a greater volume of business concerned than in any previous drought. It is, after all, a very serious matter, but like many other serious matters it is not without some humorous aspects.

In the pardonable pride which swells the heart of Los Angeles, hardships and hindrances are lost. In all the weeks that one observer has ridden the street cars he never heard a complaint about the temperamental skip-stop system, albeit it has forced girth control on 50 per cent of the railways' patrons.

The skip-stop plan was invoked early this summer to save power. To the laity it appears to be well named, for to the man accustomed to finding his particular car at any time and at any place it now seems that the cars stop at certain blocks and skip others, say, on Monday, Wednesday and Friday of each week, and on Tuesday and Thursday reserve the right to stop where they will, running according to schedule only on Saturday. It probably never has happened that a motorman, contented to stop at certain blocks on his outbound trip, has become morose with the monotony of it all, and stopped at a different set of blocks on his incoming trip. But to the absever the thought of this as a possibility appears always to be lurking in the car rider's subconscious mind.

As might be expected in the circumstances, sundry orders have been issued to the local railways by the police, the local board of public utility commissioners, and the State Railroad Commission. At one stage of the game a rider who is statistically inclined thought he had made some headway in regard to his interpretation of official pronunciamentos. He checked the first car that passed, but before the next one arrived the public utilities board had heard that another mountain stream had dried up in the last hour, and the next car skipped the charted point, stopped three blocks down the street, shooting the theory into a cocked hat.

Power conservation is as sensitive to rumors like that as the stock exchange is to a storm in Nebraska. But nobody seems to mind it all. It's probably Los Angeles pride. Why, late one night the writer had to walk home because the cars had stopped running, though it was a fairly decent hour for movie stars and night newspaper workers to be up and doing. The distance was nearly twice as far as one would have to walk for a Camel. But people don't complain.

Walking at night, after certain hours, is not however, entirely a thing of joy. The streets are dark, for all lights are turned off, with exception of one lamp at each corner of street intersections. The city, in fact, seems not unlike a medieval town. No gigantic displays flare against the sky. Automobile dealers must depend on the sales ability alone; a dyspeptic public is left to grope in the dark for its after-dinner chewing gum, unguided by the wriggling antics of electric arrow midgets; hostelries sit in dignified darkness, no longer welcoming the stranger with a flaunting sign flirting at the sky; service stations dispense oil and gasoline in a subdued glow where once was blatant light. Theater sign boards are lighted only from sundown to 9.30 p.m. and then with low-power lamps.

A dash of the ridiculous saves the situation from becoming morbidly serious. Shop windows are allowed to use sufficient, though not full, power to display the latest fall importations. M'lady's vanity won out, and window shopping is still an allowable pastime. Ten chances to one the president of the local board of public utilities, went to the meeting primed by his wife. One can see him rise, with all the dignity of the Governor of North Carolina when he spoke to the Governor of South Carolina, as he says, bowing to the ladies: "Gentlemen, it's a long time between showers."

Virginia Commission Refuses to Lift Paving Amendment

The State Corporation Commission of Virginia has refused to amend the charter of the Norfolk Railway & Light Company so as to relieve the company of the obligation of paving between tracks imposed in the original charter granted by the Legislature.

In a brief sustaining its petition the railway argued that the commission has no right to refuse to grant an amendment to a charter when it is drawn in the form prescribed by law. The company held that this duty is ministerial only and that the commission has no discretionary powers beyond seeing that the law is complied with.

In refusing to grant the amendment the commission took the position that it has the power to refuse any application for a charter or an amendment to a charter when it is clearly shown that such application is contrary to public policy. The application in question, it was held, is contrary to public policy.

In a case decided in Portsmouth the commission has shown that the question of relieving electric railways of the obligation of paving between car tracks is one which may properly be considered and decided on its merits. In the Portsmouth case the commission granted the petition of the Virginia Railway & Power Company to be relieved from this duty. The case just decided is said to be entirely different, however, the Norfolk company demanding the charter amendment as a matter of right and denying the right of the commission to refuse it.

The petition was filed on July 24. Both the city and the company were quick to file briefs.

Transit Measure to Voters

Charter Amendment Proposed at Detroit to Permit City to Carry Out Rapid Transit Program

A proposed amendment to the Detroit City Charter has been introduced into the City Council. It provides alternate means of financing the construction of a rapid transit system and establishing a commission to supervise the work. In the Council there was a long drawn-out discussion, particularly regarding the question of control of the rapid transit system when completed. It was then voted to introduce the bill carrying the amendment. In consequence the measure will lie on the table twenty days before final vote is taken to determine whether the amendment will go into the ballot at the primaries on Sept. 9. It is expected that the amendment will receive a favorable vote. According to Sidney D. Waldon, chairman of the temporary commission appointed by former Mayor James Couzens to make plans for rapid transit, the commission will have a plan of routes ready for a vote at the spring election next year if the amendment carries this fall.

OPERATION BY COMMISSION SUGGESTED

The recommendations of the Transit Commission include operation of the system by the commission during the construction period. While the commission believes in unified control of all transportation units of the city, operation by the commission was included to guard against the possibility of no control in case the city failed to name an operating organization.

It is cited that it would probably be five years before any part of the rapid transit system can be placed in operation. Before then the city may take over the operation of a bus system, or agreement may be reached on a metropolitan area covering transportation for the entire district surrounding Detroit. In either case the city might decide to do away with both the Rapid Transit Commission and the Street Railway Commission and place the transportation systems under one body. It has been suggested by Ross Schram, general manager of the D.S.R., that many economies could be effected during construction if it were understood that the D. S. R. was to have final control. Mr. Schram pointed out that by 1931, provided present progress is maintained, the D.S.R. will own an unencumbered system.

Relieved of the burden of making periodical payments for the lines which it is taking over from the Detroit United Railway the city will then have $3,000,000 to $4,000,000 which might be used to provide rapid transit equipment.

CONTROL WITH COMMISSION

As indicated previously the commission is to supervise, manage and control all the routes approved by the people in respect to construction, maintenance and operation during the construction period. The routes or any part of them are to be placed in service as soon as practicable and operated by the commission or by such other authority as may be designated by the city authorities.

Decision Authorizing Competitive Bus Service Will Be Appealed

The Washington-Virginia Railway will appeal from the decision of the State Corporation Commission of Virginia in awarding a certificate to the Alexandria Motorbus Company to operate its line from Alexandria to Washington in competition with the railway. The commission had the matter before it for more than a year. It appears that some time ago a permit was issued to operate the bus line. The bus company, however, did not receive it and, under the impression that authority had been denied to it, the company abandoned the line temporarily. Later, on discovering that the certificate had been awarded, the bus line asked for a hearing in the matter, and this was granted. In the meantime, the bus line, acquired by private parties, was being operated. The electric railway contended that the commission had exceeded its authority after the line had been abandoned in allowing a resumption of business. In the opinion in the case, the commission held that the bus line is a common carrier, that it has the usual rights to sell, buy, lease or operate, that private persons have the right to acquire such common carriers, and that the owner of the line is well within his rights to operate the line so long as he complies with the law pertaining to common carriers.

Toledo Headed for Ten-Cent Fare

Toledo now faces the prospect of a 10-cent cash fare. On Sunday, Aug. 17, the fare became 8 cents cash with five tickets for 40 cents. This was the second increase by the Community Traction Company in the last few weeks. Another increase to 9 cents cash and three tickets for 25 cents will be effective on Aug. 31. Then in ten days it is expected the next higher rate of fare will be enforced. According to Commissioner Graumlich this will be 10 cents cash and three tickets for 25 cents. A transfer rate of 1 cent is set by the Milner ordinance.

Under the present 8-cent fare the receipts per revenue passenger are about 6.6 cents owing to the large proportion of transfer passengers.

The stabilizing fund is now in "red" figures about $30,000, and the company is finding it difficult to obtain capital necessary for extensions and betterments.

It is estimated that the 10-cent cash fare with three tickets for a quarter will save the company $700 in the item of counting pennies and aid the one-man car operations greatly. More one-man cars are expected to be in operation within a few weeks.

Donational Bus Line Seeks Permit in Southern California

The Culver City-Palms Community Donational Bus Lines, now operating between Los Angeles and Venice has applied to the State Railroad Commission for a permit to act as a common carrier. It is said that this action is based on the complaint of the Pacific Electric Railway in filing complaint with the State Railroad Commission against the Community Bus Line operating between Los Angeles and Venice.

For some time the Culver City-Palms buses have been running on the "honor system," whereby passengers paid a fare if they felt so inclined and as much as they liked. A contribution box is opposite each seat in the buses. The community bus line asks the Commission to authorize it to operate in competition with the Pacific Electric interurban trains. The fares to be charged are as follows:

From the end of Los Angeles Railway car line in Los Angeles to Culver City and Palms, 10 cents each way.

From Culver City and Palms to the beach at Venice, 15 cents each way.

From end of Los Angeles Railway line in Los Angeles to Venice, 25 cents one way, 40 cents round trip.

Santa Monica Bus in Operation

The Pacific Electric Railway, Los Angeles, Calif., placed a new bus line in operation on Aug. 4 in territory heretofore unserved. The new line is known as the Pico Boulevard line. It extends from the terminus of the company's local line in Los Angeles at Vineyard Junction to the company's station at Utah Avenue in Santa Monica. The distance of the new bus line between Los Angeles and the beach city of Santa Monica is 10.7 miles. The city of Santa Monica is also served by the company's electric interurban lines, but over two other separate routes.

Twenty-nine passenger coaches of the latest improved design were entered in the new service. An adjunct to this service was also established in the nature of motor coach shuttle service between the Pico Boulevard route and Sawtelle. Transfers are issued from the buses to the railway in local service in the Santa Monica Bay District.

The Pacific Electric Railway now has 140 motor coaches in operation. Thirty-six are used on lines of the Los Angeles Motorbus Company, of which it is joint owner with the Los Angeles Railway, and 104 are in local and interurban service.

President Barnes Says Buses in Louisville Are Unprofitable

Operation of regular bus routes in Louisville by the Kentucky Carriers, a subsidiary of the Louisville Railway, has not proved profitable. J. P. Barnes, president of both companies, announced a few days ago that the company was losing about $3,000 a month with its bus line. He said the company was figuring on plans to take the route out of the East end, and run it into the West end, a more thickly settled territory. There have been times when the company could have placed its buses in service to the race track, ball park, or other amusement feature, but it has kept the vehicles on regular routes at all times and apparently worked diligently to build profitable business. It is hoped that a line can be established to the West End that will at least break even. There is a 10-cent fare on the buses, without transfers, compared with a 6-cent cash fare, with transfers on the street cars.

Rules Ottawa Electric Company Must Have Bus License

The Ottawa Electric Railway, Ottawa, Can., was recently found guilty of operating buses without having obtained a license in the town of Eastview, and taking on and discharging passengers within the limits of the municipality. The town of Eastview had passed a by-law licensing and regulating bus traffic in the city limits. The court ruled that the town had authority to do this. After the decision of the court the railway applied to the Eastview police chief for a license to operate its bus line. F. D. Burpee, general manager of the Ottawa Electric Railway, announced that pending the granting of the license the company had withdrawn its buses from passenger service.

Some time ago the Ottawa Electric Railway had the Ottawa Council pass a by-law forbidding any bus lines from picking up and discharging passengers on the same trip within the city of Ottawa. However, the town of Eastview got behind the bus company operating for a 5-cent fare from post office in Ottawa out through the town of Eastview to Notre Dame Cemetery, ½ mile east of the town's limits, and has obtained a franchise from the Ontario government covering this route. This stopped the Ottawa Electric Railway buses, which operated from the eastern limits of Ottawa, from running further than the eastern limits of Eastview.

The town of Eastview, in the first place, wanted the Ottawa Electric Railway to extend its rails through its municipality, but the railway wanted a straight 5-cent fare, while the town demanded a 5-cent fare throughout the railway system to and in Ottawa. The railway's activities in Eastwood have been referred to previously.

Jitneys Quit in Akron After Six Months' Struggle

Abandonment of all city jitney lines which have operated in Akron, Ohio, for the last six years takes place this week. Following the re-routing of the jitneys so as to take them off the streets over which the Northern Ohio Traction & Light Company operates railway lines, the jitneys failed to make a living. At a meeting of the Jitney Association members with city officials on Aug. 18, the jitney men asked to be permitted to compete along the lines of the street railway's electric and bus routes. The city refused and the jitney men voted to give up the struggle and divide a $23,000 fund which they had accumulated under the city jitney ordinance for bonding purposes. Jitney men were informed by the city they must comply with all terms of the city ordinances or get out of business within forty-eight hours. They immediately decided to get out.

Bus Line Suggested for Greenville.—Instead of extending its railway lines, the Southern Public Utilities Company, Greenville, S. C., is seeking the cooperation of that city in a move to start bus lines.

Wants Estimate of Income on Eight-cent Fare in Springfield

Opponents of the proposed fare increase from 7 to 10 cents on the lines of the Springfield Street Railway, Springfield, Mass., at hearings conducted by the State Public Utilities Commission in Springfield, on Aug. 18, succeeded in having the commission ask the company for estimates of its annual income based on an 8-cent fare for the six months' period from January to June, 1924, instead of on the patronage for the year 1923. The commission also declined to permit the use of an independent audit of the company's finances, made at the direction of the Springfield Chamber of Commerce and paid for by the railway.

Opponents of the fare increase lost their appeal for a six months' delay of the hearing to permit further audit of the company's finances. The commission directed that the 8-cent fare income estimates be presented at a further hearing in the State House in Boston, on Aug. 20. The operating expenses of the company have been greatly increased recently by an arbitration decision granting increased wages to its employees. This is one of the principal reasons for the application for a fare raise.

Senator Lacey Pardoned

Robert C. Lacey of Buffalo, former State Senator, who pleaded guilty in Federal Court to perjury in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line interurban train on the International Railway in the 1922 strike of platform employees, has been pardoned by President Coolidge. The pardon restores Lacey's citizenship rights, the privilege to vote and hold public office. He is a candidate for re-election this fall. Lacey was fined $500 and sentenced to one day in jail.

Buffalo newspapers express amazement that the President granted a pardon to Lacey after his alleged participation in the dynamite conspiracy outrage. The *Evening News*, after reviewing the case and pointing out that Lacey is a confessed perjurer, says:

> Now, seeking election and vindication, he (Lacey) will be able to point to the President's action as giving him a clean bill of health. Neither politically nor morally does the President's action appear to be justified.

The *Express* says editorially:

> It is not Lacey's time for reappearing. Let him go away back and sit down until his offense has been outlived.

Subway Program of New York City Administration Revealed

John H. Delaney, head of Mayor Hylan's new Board of Transportation in New York City, made public for the first time in an interview on Aug. 16 the city's plans for new subway construction to help bring about a solution of the transit problem. The three outstanding conclusions that appear to dominate the policies of the Hylan regime have been summarized as follows:

1. There is no intention to sanction an increase over the present 5-cent fare, at least for seven or eight years.

2. It is the purpose of the Board of Transportation, reflecting the fixed views of the Mayor, while pressing subway construction on the limited funds available, to continue to center its efforts on obtaining a constitutional amendment authorizing the issuance of $275,000,000 in subway bonds to replace the new self-sustaining water bonds.

3. The program is to complete as speedily as possible the Fourteenth Street-Eastern District line, to defer work on the Nassau Street line, and to begin construction of the city's independent system, which later may or may not be linked with existing subways under municipal operation.

Mr. Delaney expects the study of the route to be followed by the projected independent system will be well advanced within about two months. The new system, roughly speaking, is expected to comprise:

A line from Washington Heights, or 173d Street, to the lower part of the city, running under Central Park West and through Sixth or Eighth Avenue from Fifty-ninth Street south.

A line from near the Brooklyn end of the Brooklyn Bridge through the central part of Brooklyn and over to Greenpoint or, perhaps, Long Island City, Queens.

A line from Jamaica, L. I., to connect with the Manhattan-Bronx trunk line.

A suitable connection with the passenger and freight tunnel now being built to connect Staten Island with South Brooklyn with a line through Brooklyn to Manhattan.

G. M. Dahl, chairman of the executive committee of the Brooklyn-Manhattan Transit Corporation, has taken issue with Mr. Delaney over the need for the Nassau Street line.

Municipal Road an Object of Charity

The butcher, the baker and the candlestick maker of the town of Lincoln, Ill., have set aside a day to devote to the municipal railway, which is now nearing the rocks.

At least $2,000 is needed for repairs to the system, and public-spirited citizens are to devote one day to selling tickets on the cars. The merchants have promised to man the cars, collect fares and endeavor to sell a supply of tickets to the riders. The fund accumulated during the course of the day, it is hoped, will be sufficient for the repairs.

The fare, which has been a nickel, will also be boosted to a dime for the one day. Contributions will also be asked to supplement the fund being raised for the street-car lines.

Bus Service Starts in Decatur

Bus service was started in Decatur, Ill., on Aug. 1 by the Illinois Power & Light Corporation, following a period of great stress and subsequent effort to install a bus-railway service. On the first day, 7,501 passengers were handled by the buses. On the five lines, with eleven buses in operation, 885 transfers were picked up by patrons who started their ride on the trolley cars. All told, more than 20,000 persons rode upon the trolley cars and buses during the first day.

The bus had its beginning in Decatur, about four years ago when the railway's request for an increase in fare was refused. At that time bus service was started by John Borden. Others were quick to enter the field. Duplication of service and confusion followed. As a result of surveys made by traffic experts, the railway decided to install a car-bus service. Following out this idea it bought up the competing bus lines, junked much of the old equipment and substituted a number of Mack cars. The fare on the trolleys and buses is 6 cents with transfers from one to another.

"Main Thoroughfares" in Youngstown to Be Observed

The new traffic code for Youngstown, Ohio will soon be put into force. Certain streets are designated as main thoroughfares. Over these streets traffic will have the right-of-way, while traffic in the intersecting streets will be required to come to a full stop before proceeding into the main thoroughfare. Under the law all streets in which railway cars operate are considered main thoroughfares. Other streets have also been designated main thoroughfares by the ordinance enacted by the City Council. The Pennsylvania-Ohio *Electric News*, the official pamphlet of the Youngstown Municipal Railway, says that the conferring of the right-of-way on vehicles in the main thoroughfares does not mean that these vehicles can disregard vehicles coming off of side streets; that there is still in the city ordinance a clause which says cars must operate under control while approaching intersections; further, Section 13 states that the cars must be provided with a signal bell or gong and that this must be sounded at least 100 ft. distance from all street intersections and continually while passing such intersections.

Wage Arbitration in Boston Under Way

Public arbitration hearings have been started at Boston to determine what the wages for the uniformed employees, the platform men, of the Boston Electric Railway shall be during the next twelve months. The special arbitration board has held three sessions, and has taken some evidence from Edward Dana, the general manager of the company, and has heard an opening statement from James H. Vahey in behalf of the men. Although a member of the arbitration board Mr. Vahey is conducting the men's case as their counsel. The counsel for the Boston Elevated is H. Ware Barnum.

It developed that it was the Elevated which first gave notice of a desire to change the present schedule of wages. That company asked the men to accept a reduction of 5 cents an hour, which would make the maximum rate 60 cents an hour. The Amalgamated then followed with demands much larger than had been generally supposed. In the matter of pay the union asked for an increase of 20 cents an hour. Besides this the new demands of the men are for free uniforms, free transportation at all times by means of ticket books to be issued to them; two weeks vacation with pay and double pay for all overtime. The men also want an increase in the allowance for meals when the trip takes them to some point from which they cannot get back to their usual places for luncheon. They are getting 65 cents under the old agreement and they want 85 cents. After the opening sessions the hearings were adjourned for a week. It will probably be several weeks before there is a decision.

Railways Advertise Their Own Bus Proposals

Both the Third Avenue Railway, New York, and the Brooklyn-Manhattan Transit Corporation, Brooklyn, are advertising in their cars the fact of their willingness to supplement service on their railway lines with bus feeders. The placard of the Third Avenue contrasts the proposal of that company with the one advanced by the Fifth Avenue Coach Company for operating rights on the Grand Concourse. No transfers are proposed in the offer of the coach company, while the railway proposes transfer from bus to bus and transfer from bus to railway.

The placard of the Brooklyn company illustrates at the top the type of double-deck bus which the company contemplates putting into service. The question that the company asks is: "Where do you need buses?" The placard then says:

"B.M.T. buses—ten double deck, seating sixty-seven each, and two single-deck, seating twenty-nine each, are ready for service. We have petitioned the Board of Estimate for bus franchises. Write for copy of letter."

The letter referred to is the proposal made by Chairman Dahl to the city, in which he reviewed the situation at length.

News Notes

Athens to Quit the Pass.—The Athens Railway & Electric Company, Athens, Ga., at an early date will discontinue the pass system that has been in use for several months. The pass has been sold for $1.

Wants Jitneys Curbed.—Thirty employees of the Worcester Consolidated Street Railway, Worcester, Mass., recently appeared before the Selectmen of Clinton, Mass., and demanded that the board take some action to stop jitneys from sniping prospective railway passengers. They expressed the fear that if the tactics of the jitney men were not curbed the Consolidated would suspend operation of cars on the Leominster to Clinton and Hudson to Clinton lines. The Selectmen expressed the desire to have the cars continue in service.

Subway Hearing Postponed. — Hearings on the applications of the Highway Commission to construct subways in North Sacramento, Calif., under the tracks of the Sacramento Northern and the Western Pacific have been postponed to Sept. 16. They were set by the Railroad Commission to be held on Aug. 22.

Recommends Buses As Feeders.—The Public Utilities Bureau of Louisville, Ky., in a recommendation to the Board of Public Works, has suggested that bus lines be established as feeders, or extensions to some of the local railway lines. The recommendations favor the bus lines to be operated in conjunction with the street cars, and on the same fare rate, with transfers to cars at terminals, and from these cars to intersecting lines. The bureau agrees in part with the contention of the railway that costs of extension of rails is prohibitive.

Will Change to One-Man Operation.—The Linwood Street Railway, which operates between Whitinsville and Linwood, Mass., will operate each of its two cars with one man as soon as practicable. The line is about 2 miles long. It is owned by officials of the Whitins Machine Works. It is used also as a freight road.

Will Serve as Belt Line for Switching Freight.—The Tacoma Municipal Railway may become a belt line road for the switching of all freight cars to and from tideflat industrial plants. Contracts looking toward this end have been signed by each of the four transcontinental railroads and submitted to the City Council. The proposal will be examined by the city attorney. The contracts are the result of a year's work on the part of the secretary of the traffic and transportation bureau of the Chamber of Commerce. A digest of the prospective freight business of the municipal line shows that its use as a belt line will probably increase municipal carline earnings by $25,000 a year. This increase will go a long way toward making the road self-sustaining.

Trouble Caused by Jitneys. — Allen McReynolds, attorney for the Southwest Missouri Railroad, Joplin, Mo., recently told the Joplin City Commission that if jitneys were eliminated the railway could be operated at a profit. Losses of the company in operating its city lines in Joplin for the last ten-months' period exceeded $50,000. Four of the five city lines were operated at a total loss of $54,873. One line made $4,352.

Will Co-operate for Crossing Elimination.—The State Highway Commission of Kentucky has announced that plans have been started for the elimination of a double grade crossing near Simpsonville, Ky., on the Shelbyville-Frankfort-Lexington and Louisville pike. The intention is to put in either an underpass or overpass, carrying the Louisville & Nashville Railroad steam tracks and Louisville & Interurban traction lines.

Company Sues—Counter Suit Filed.—The Virginia Railway & Power Company is suing a woman patron for 14 cents for transportation fees in Norfolk for her son, who is alleged by the company to be six years old and not entitled to ride free. The boy's mother has countersued. She is asking for $10,000 because of humiliation caused by an "uncivil" conductor who claimed her son was more than four years and therefore not exempt from fare collection. In Civil Justice Court the company took a non-suit on Aug. 11. Motion for a continuance on the grounds that a material witness was out of the city was overruled. The attorney for the railway said his company would take a non-suit in order that another suit might be brought upon his witness' return.

Railway Man on Motor Vehicle Committee. — L. H. Palmer, vice-president and general manager of the United Railways & Electric Company, Baltimore, Md., has been appointed by Secretary of Commerce Herbert Hoover to serve on the committee on motor vehicles which will make an exhaustive study prior to the national conference on Street and Highway Safety, scheduled for some time in the fall. Mr. Palmer will work under the chairmanship of H. M. Crane, president of the Society of Automotive Engineers. Some time ago Secretary of Commerce Hoover was asked to lend his efforts toward organizing a national conference on the subject of street and highway safety. Mr. Hoover has suggested that the conference should be preceded by exhaustive investigation into the different phases of the problem and so various committees have been formed to deal with the particular issues.

Trackless Trolley Petition in September.—A hearing on the petition of the Capitol District Transportation Company for certificates to operate trackless trolleys in Cohoes and buses in Rensselaer, will take place at the office of the Public Service Commission Sept. 9. Ernest Murphy, general manager of the company, said recently that if the certificates are granted, work will go forward rapidly. The Capitol District Transportation Company is a subsidiary of the United Traction Company, Albany, N. Y.

Awards Announced.—For attaining a satisfactory record and having performed distinguished service, twelve trainmen of the Birmingham Electric Company, Birmingham, Ala., will receive the 2½-year gold buttons as the award for the first six months of 1924. Fifty-three men will receive the 1½-year silver buttons, ninety-nine men will receive one year silver buttons and 140 men will receive the six months' bronze buttons. The transportation department of the company announces that it appreciates the effort being put forth on the part of these men in handling passengers every day and in discharging the obligations and duties of the work with credit to themselves and the company.

Binghamton Railway to Supplement Service.—An application for permission to operate buses in Johnson City will soon be made to the Public Service Commission by the Binghamton Railway, Binghamton, N. Y. It is planned to operate under the name of the Binghamton Auto Bus Lines, Inc., with the same officers as the railway company. Service will commence on Sept. 1 with two Mack buses. A franchise has already been granted by the board of trustees of Johnson City.

New Franchise Granted at Laurel.—Electors of the city of Laurel, Miss., have approved a new franchise to the Laurel Light & Railway Company. The new grant will make it possible for the company to make a bond issue of $100,000. About $60,000 will be used to enlarge the power plant, doubling its present capacity, $20,000 will be spent on the distribution system and a like amount in improvements in the railway department. The period of the new franchise is twenty-five years.

Bus Purchase Bill Passed by Georgia Legislature.—By vote of 131 to 5 the Georgia House has passed a bill authorizing electric railways to acquire stock in bus lines. This bill passed the Senate and will go to the Governor for his signature. The measure permits railways to purchase stock in bus lines to enable the railways to extend service through the operation of the buses as feeders.

Denies Reports on Purchase.—A. H. Schoellkopf, vice-president of the Niagara Falls Power Company, Niagara Falls, N. Y., has denied reports that his company is seeking to purchase the franchise, right-of-way, equipment, etc., of the Niagara Gorge Railway. The railway operates a belt line route down the Canadian gorge and up through the lower American gorge of the Niagara River, the Canadian half of the trip being made over the Park & River division of the International Railway, Buffalo. The power company was said to be seeking control of the railway to secure power rights in the lower gorge owned by the railway.

Double Stops Eliminated in Mobile.—The Mobile Light & Railroad Company, Mobile, Ala., in co-operation with the officials of the police department in attempting to relieve traffic congestion in the downtown district, has abandoned all double street car stops.

Change Sought in Bus Regulatory Legislation.—Tentative regulatory legislation for approximately 1,000 buses in North Carolina, to be sought at the forthcoming special session of the General Assembly, will place the control of the buses—as common carriers—under the State Department of Revenue instead of the Corporation Commission. Two reasons are offered in support of the proposal that the control be given by the Legislature to the Commissioner of Revenue. One is that by not asking that they be placed under the jurisdiction of the Corporation Commission the objection of Governor Morrison will be removed. The other is that the embarrassment which might come to the commission, in passing upon controversies as to parallel railroad and bus lines, will be obviated by designation of the Commissioner of Revenue as the control.

Bravery of Starter Recognized.—Ethington B. Merritt, suburban car starter in the employ of the United Railways & Electric Company, Baltimore, has been presented with a gold watch by the company in recognition of his bravery in frustrating a bandit who attempted to hold up a car. The presentation was made by L. H. Palmer, vice-president and general manager of the company.

Interurban Division to Have One-Man Cars.—One-man cars, which now are being used on a large number of local lines of the International Railway in Buffalo and Niagara Falls, will be extended to the Kenmore-Tonawanda interurban division early in September, according to present plans of the company. This will be the first interurban division to operate with one-man cars in western New York. Crews are now being trained for the one-man operation of this division. These cars operate from the Buffalo-Kenmore city line through Delaware Avenue to the Tonawanda-North Tonawanda city line, a distance of about 7 miles.

Safety Conference in Indiana in September.—Laws requiring all motor traffic to stop at interurban and railway crossings and prohibiting more than two persons from riding in the front seat of an automobile are suggested by G. O. Nicolai, of the Terre Haute Traction & Terminal Company, to cut down the death toll from automobile accidents. These were made following announcement by the Public Service Commission of a conference in September to promote safety in Indiana.

New Orleans Public Service, Inc., Extends Bus Auxiliary Service.—The second line of buses to be established by the New Orleans Public Service, Inc., New Orleans, La., was started Aug. 4. It now operates along Frenchmen Street from Florida Walk, a section of the city as yet too thinly populated to make it profitable for the railway company to extend its lines, and at Decatur Street, its turning point, buses traverse a good portion of the lower part of New Orleans, to Canal Street. The rate of fare charged is the same as that on the street cars—namely 7 cents—with transfer privileges to all intersecting railway lines. In New Orleans, all car stops, both for boarding and discharging passengers, are made on the far side of the street, except on streets with intersecting street car lines. An innovation is now proposed in the plan to stop on the near side of the street.

"Weekly Pass" Time Extended.—Another lease of life for the $1 weekly pass on the lines of the Tacoma Railway & Power Company, Tacoma, Wash., has been granted by the State Department of Public Works. The date for discontinuing the use of the pass has been advanced to Sept. 14. This puts its operation past the time for the primary election at which the railway desires to submit its proposed new franchise to the people. The Tacoma property is asking citizens to petition the City Council to place the new franchise proposals on the primary ballot. The company is seeking to do away with paving, gross earnings tax and other requirements. As part of its franchise proposal the company has suggested that the use of the weekly pass be extended for at least a year. It would also agree to install service with buses at the request of the City Council.

Advertising Contracts Not Renewable.—The Public Service Transportation Company, a subsidiary of the Public Service Railway, won a victory in the Court of Chancery when Chancellor Walker refused to modify a decree of Vice Chancellor Foster respecting advertising in motor buses acquired by the company from independent operators. The Schindler Advertising Company has contracts with former jitney men for display advertising. Now that the Public Service is acquiring buses of independent operators the advertising contracts are good until the time limit for them expires. The contracts are not renewable.

Foreign News

Berlin Elevated & Underground Railways

A reminder of the fluctuations during 1923 of the German mark is shown in the annual report of the Berlin Elevated & Underground Railway, recently issued. Americans have had some difficulty in raising rates with a depreciated currency, but they have not been obliged to raise the fare per passenger from 5 cents to $130,000,000, which is practically at the rate of increase which was made on the Berlin Elevated & Underground Railway during 1923. Under such circumstances, figures on gross and net receipts do not mean much, so this article will be confined largely to statistics other than financial.

During the year two extensions were put in service on what is known as the North-South Railway operating approximately at right angles to the old line which ran East and West. Another section of the North-South line was opened April 19, 1924. The equipment of the company includes 440 cars, which during the year made 5,362,696 train-kilometers, with trains up to six cars each. Besides its elevated and underground lines, the company operates a short trolley extension to the East, with twelve motor cars and nine trail cars.

PASSENGERS CARRIED AND AVERAGE FARE CHARGED, BERLIN ELEVATED & UNDERGROUND RAILWAY, 1923

Month	Number of Passengers	Average Fare per Passenger in Marks
January	12,812,562	49
February	13,905,870	106
March	14,291,894	181
April	13,887,919	221
May	13,657,837	232
June	14,977,437	405
July	14,860,280	1,571
August	13,460,053	28,559
September	15,506,580	982,777
October	13,990,201	239,906,000
November	12,237,895	56,082,000,000
December	13,958,480	130,133,000,000

Mr. Dalrymple's Views on Tramway Situation

James Dalrymple, general manager Glasgow Corporation Tramways, presented a paper on municipal tramway administration at the annual meeting of the Institute of Public Administration in Oxford July 21. He outlined the Glasgow system of management, which had enabled repayment of the entire sinking fund in 1917, sixteen years after electrification of the tramways, and carry on through the difficult period following the war with little inconvenience. A number of smaller British municipal tramway undertakings were operating at a loss, he said, largely due to motor bus competition. The buses, unlike tramways, pay no rates to the cities and are not required to keep up a regular service, but simply take the cream of the traffic. It is Mr. Dalrymple's opinion however, that when normal trade in the country is restored the tramways will earn sufficient revenue to make both ends meet.

Financial and Corporate

Unfortunate Conditions in Mexico City Cause Slump in Earnings

The Mexico Tramways, Mexico City, Mexico, for the year ended Dec. 31, 1923, realized net earnings (Mexican currency) of $1,146,049 after allowing for taxes and depreciation. This compares with net earnings of $2,097,918 in the preceding year. The gross earnings in 1923 were $12,266,830, against $12,942,417 in 1922. The total number of passengers carried on the Mexico Tramways in 1923 was 103,083,773; in 1922 the number was 109,286,678. The total car-miles operated was 17,371,229 last year and 16,093,889 in 1922. In the report to the president and directors of the Mexico Tramways, G. R. G. Conway, managing director, states that the year's results proved very unsatisfactory due to labor difficulties in the months of January and February, jitney competition and the general business depression during the latter part of the year. The poor showing was also partially due to the uprising against the government in December.

For experimental purposes the company has established an omnibus service from the center of the city to a residential district and also a suburban service. The total number of single-deck type buses in daily operation is twelve during the week and thirteen on Sundays. Much opposition to this service was experienced from the owners of the jitneys and many difficulties arose in trying to obtain satisfactory routes for their operation. But in view of the fact that the buses, up to the present, have not been allowed to run into the downtown business district, they have not so far been able to compete with the jitneys.

During the year the company made certain changes in its rolling stock and tracks in order to adopt single-end operation of the cars so as to introduce fare boxes and the "pay-as-you-pass" system.

Lease of Interurban Company's Tracks Solves Indianapolis Problem

A tentative lease by the Indianapolis Street Railway of the tracks of the Union Traction Company of Indiana from Forty-sixth Street, Indianapolis, north on College Avenue to Broad Ripple has been signed. The lease will be submitted immediately to the Public Service Commission for approval. Until then the terms will not be made public. The Union Traction Company will continue to operate its interurban cars over the College Avenue tracks, but it is understood it will discontinue its service to Broad Ripple. Under the Public Service Commission order of April 18, the Indianapolis company was directed to extend its service to Broad Ripple by Sept. 1. The rate on the Union Traction cars from Broad Ripple to the city is 10 cents, with a 7-cent fare or a city street car ticket for a ride wholly south of Fifty-fourth Street; 5 cents between Fifty-fourth Street and the north limit of the line. Under the city company's service there will be a 7-cent fare from Broad Ripple to Indianapolis.

New Officers Elected for Indiana Interurban

The Indiana Service Corporation, Fort Wayne, Ind., will assume active operation of the Fort Wayne & Northwestern Railway, and a merger is expected to be completed within sixty days, according to announcement made by Robert M. Feustel, president of the Service corporation.

In preparation for the merger a number of changes have been made in the officers and directors of the Fort Wayne & Northwestern Railway. Resignations have become effective as follows:

President, C. J. Munton, Kendallville; first vice-president, William L. Taylor, Indianapolis; second vice-president, J. H. Rose, Fort Wayne; secretary-treasurer, V. R. Shick, Kendallville, and directors, Mr. Munton, Mr. Taylor, Mr. Rose, Raymond H. Smith, New York, and F. Leonard, Fort Wayne.

New officers have been announced as follows:

President, Mr. Feustel; vice-president, H. E. Vordermark, Fort Wayne; secretary-treasurer, F. H. Schmidt, Fort Wayne; general manager, Henry Bucher, Fort Wayne. The board of directors includes the officers and F. M. Tayte and James M. Barrett, Fort Wayne.

Seeks Abandonment in Wallkill

The Wallkill Transit Company, Middletown, N. Y., has petitioned the Public Service Commission for permission to abandon its rights and franchises in the towns of Wallkill, Goshen and village of Goshen, Orange County. The route proposed to be abandoned is being conducted at a loss of from $30 to $50 a day, the company stated.

The company on June 25 was permitted by the commission at the request of the city administration of Middletown to discontinue railway service in Middletown and substitute a bus service, operated by the Wallkill Public Service Corporation, a subsidiary concern. Since then, the petition sets forth, the company has continued the operation of the line from the city limits to Franklin Square, pending the filing of a petition by the Wallkill Public Service Corporation for consent to operate a bus line over the route from Franklin Square to the city limits and through the towns of Wallkill to Mechanictown and Phillipsburgh.

The petitioner claims that for the past year it has not earned in excess of the amount sufficient to pay the wages of its employees and the price of the coal consumed. Since April conditions have been growing worse.

Changes in Control and in Officials at Montreal

E. A. Robert resigned recently as president of the Montreal Tramways. Accepted at the same time as Mr. Robert's resignation were also the resignations of J. M. Wilson, George G. Foster and J. M. McIntyre. Elected to fill the vacancies thus created were: Julian C. Smith, Howard Murray, Gordon W. MacDougall, and George Montgomery. Julian C. Smith, vice-president of the Shawinigan Water & Power Company was elected president, replacing Mr. Robert. The board now consists of these four newly-elected directors together with Senator Lorne C. Webster, J. L. Perron, William C. Finley, W. G. Ross and P. J. McIntosh, who is a vice-president of the company.

Another important announcement is that the United Securities, Limited, has secured control of the Montreal Tramways & Power Company through the deposit with the Montreal Trust Company of more than 92,000 shares of the stock of Montreal Tramways & Power Company for exchange into the shares of the United Securities, Limited. It has also been announced that more than 33,000 shares of Quebec-New England Hydro Electric Corporation have been deposited in favor of United Securities, constituting share control of both companies.

The resignation of Mr. Robert after a term of fourteen years as head of Montreal's traction system is the culmination of events which started to come to a head less than three years ago, and resulted in his dropping out of company after company which comprised part of Montreal Tramways & Power Company, the holding company of Montreal Tramways.

Line Discontinues in Gardner

Directors of the Gardner-Templeton Street Railway, Gardner, Mass., have announced the retirement of Charles Mulhado as president of the road and Ralph Kelly as clerk and treasurer. The company has also announced discontinuance of the Main and South Main Street line and the tracks and overhead equipment will be removed.

The line has been operating only two days a week, Tuesday and Saturday, and the decision to discontinue it entirely was due to lack of patronage. Superintendent Louis Starkey is in charge temporarily with headquarters at the East Templeton carhouse. The company operates in Templeton, East Templeton, Otter River and Baldwinville.

Organization of the company by Mr. Mulhado followed the receiver's sale of the Northern Massachusetts Street Railway properties on Jan. 1.

Abandonment Allowed on Trenton Line—Buses to Be Substituted

The Board of Public Utility Commissioners has granted the application of the Trenton & Mercer County Traction Corporation, Trenton, N. J., to abandon railway service between Pennington and Hopewell and to substitute buses between these points. Approval was also granted to the company for a through service of buses between Hopewell and Trenton in conjunction with railway service between Trenton and Pennington. The trolley route to be abandoned is a part of the line operated between Trenton and Hopewell. The board also required that the overhead line should be removed from Pennington to Hopewell within three months from Aug. 1 and that within a year from that date the tracks be removed.

The company has pointed out to the New Jersey Board of Public Utility Commissioners that to continue trolley service between the two towns would entail an expenditure of more than $50,000 within the next two years. In ruling on the bus operation, the board required that the bus line be run on a reasonable schedule and that a rate of fare be passed upon after the presentation for approval of local permits.

Petition to operate the proposed bus line from Trenton to Hopewell was later filed with the Trenton City Commission by Rankin Johnson, president of the Central Transportation Company. If the permit is granted bus service will begin on Sept. 1.

Preferred Stock Offered.—Beyer & Small, Maynard S. Bird & Company and Charles H. Gilman & Company, Portland, Me., are offering at 86 and dividends to yield about 7 per cent $1,000,000 of the 6 per cent cumulative preferred stock of the Cumberland County Power & Light Company, Portland, Me. The company is the largest public utility in the State. It supplies railway service in Portland and vicinity. The proceeds of this issue, as well as the proceeds of the sale of 3,032 shares of common stock will be used to reimburse the company for a portion of the cost of the new addition to the steam plant at Portland.

Line Ceases to Operate.—The Montoursville Passenger Railway, Williamsport, Pa., running for twenty-seven years, has ceased to operate, being abandoned by the Williamsport Passenger Railway. Traffic over the route will be handled by the Lycoming Auto Transit Company, which operates between Williamsport and Montoursville. The line was 5.5 miles long.

Cheyenne to Give Up Railway.—Abandonment and dismantling are now under way in Cheyenne, Wyo., by the Cheyenne Electric Railway. Bus operation was started by W. E. Deneen at the request of the railway on Aug. 16 under a special permit from the city authorities until the hearing before the Public Utilities Commission on Aug. 29. He is operating one Reo bus and two more are en route. The company has been operating at a heavy loss for a number of years, due to many reasons, notably high taxes and a $10,000 paving improvement which the company could not finance. Moreover, the earnings were effected because the line was blocked from running cars downtown while sewer and roadway improvements were under way. The Cheyenne Electric Railway is 5.5 miles long.

Allowed to Abandon Lines.—Finding that operation by the Union Traction Company, Santa Cruz, Calif., of its Santa Cruz Laveaga Park and Santa Cruz-Seabright-Capitola lines is not justified by the present and prospective traffic, the California Railroad Commission recently authorized the company to suspend service on these lines and to abandon and remove the tracks. Authority to abandon, however, contains the provision that the traction company substitute bus service for the rail service. In accordance with this provision the commission has granted to the traction company a certificate of convenience and necessity to operate a stage line as a common carrier of passengers between Santa Cruz and Capitola and intermediate points and between Santa Cruz and Twin Lakes and intermediate points.

Lake Charles Property Sold.—It is reported that the Eastern Texas Electric Company of Wilmington, Del., has purchased the street railway, electric light, gas and water systems and plants in Lake Charles, La. The company has a capital of $2,500,000 and received authority to sell $1,100,000 of 7 per cent preferred stock. It is a holding company that controls public utilities in Beaumont and Port Arthur, Texas. The purchase is reported to have involved about $1,000,000.

Seeks to Abandon One Mile Line.—Permission to discontinue railway service over the East Van Buren line from the Frisco station in Van Buren to the Smelter, has been asked in a petition filed with the City Council by the Fort Smith Light & Traction Company, Fort Smith, Ark. Loss in operation is the reason given. The company asks the right to take up the track.

Service Resumed by Long Island Line.—Service on that portion of the lines of the New York & Long Island Traction Company on the south side of Queens County, which was abandoned last Winter, was resumed on Aug. 17 as far west as New York Avenue, otherwise known as Jamaica Junction. This is at the point where the line formerly running between Rosedale and Grant Avenue, Brooklyn, intersected with the line running from Jamaica to Far Rockaway. Service has been given on the south side between Freeport and Rosedale. With the resumption of service from Rosedale to New York Avenue transportation by electric railway from Freeport, Rockville Centre, Lynbrook, Valley Stream and Rosedale, to Jamaica on a regular 30-minute headway is in vogue.

Augusta Notes Extended.—Directors of the Augusta-Aiken Railway & Electric Company, Augusta, Ga., have declared operative the plan for an extension to Dec. 1, 1935, of the five-year notes that were due on June 1 of this year. In view of the bondholders' acceptance of the plan interest on the extended notes will be at the annual rate of 6 per cent instead of 5 per cent as previously. Interest payment in cash on the 5 per cent notes also has been resumed. Disbursements in cash on this issue were deferred five years ago by funding the coupons for five years up to and including the Dec. 1, 1923, coupons into interest-bearing notes, all of which came due on June 1, 1924. By extending the maturity of these notes to 1935 they will fall due on the same date as the bonds.

Report on Abandonment Effected.—The Alabama Public Service Commission has taken under advisement the evidence presented to it at the recent hearing on the petition of the Alabama Traction Company for permission to discontinue service in Albany and Decatur. It was brought out that the company was making no money in the operation of cars in the Twin Cities.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	Aug. 1924 **6.39**	July 1924 **6.98**	Aug. 1923 **6.92**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	July 1924 **155**	June 1924 **158**	July 1923 **169**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	Aug. 1924 **221**	July 1924 **221**	Aug. 1923 **214**	Sept. 1920 **232**	Apr. 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5 91	July 31 1924 **3.19**	June 30 1924 **3.26**	July 31 1923 **5.91**	July 31 1920 **11.12**	July 31 1924 **3.19**
U.S. Bank Clearings Outside N. Y. City (Billions)	July 1924 **16.24**	June 1924 **15.28**	July 1923 **15.40**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures Number Liabilities (millions)	July 1924 **1,533** **49.18**	June 1924 **1,561** **38.05**	Jul 1923 **1,405** **40.22**	Jan. 1924 **2,258** **109.1**	Sept. 1923 **1,279** **30.83**

Conspectus of Indexes for August, 1924

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	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Aug. 1924 **213.2**	July 1924 **214.4**	Aug. 1923 **221.5**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	July 1924 **147.9**	June 1924 **144.6**	July 1923 **150.6**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913 = 9.21	Aug. 1 1924 **12.62**	July 1 1924 **12.23**	Aug. 1 1923 **12.82**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's Wholesale Commodities 1913 = 120.9	Aug. 1 1924 **188.0**	July 1 1924 **185.5**	Aug. 1 1923 **186.7**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	July 1924 **143**	June 1924 **142**	July 1923 **147**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	July 1924 **161.7**	June 1924 **161.7**	July 1923 **161.9**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Authority Sought to Abandon Some Riverside Lines.—In an application filed with the California Railroad Commission on Aug. 11, the Pacific Electric Railway, Los Angeles, asked for authority to abandon service and remove the tracks on certain streets in the city of Riverside. The company says that operation over the rails specified has been conducted at a loss for some time, and that continued operation will require the expenditure of large sums for reconstruction work which is not justified by the prospective patronage. The lines to which reference has just been made are located on Brockman Avenue, Fourteenth Street, Myrtle Avenue, Seventh Avenue and Houghton Avenue.

Joint Operating Agreement Reached.—An agreement has been reached between the Southern Pacific Company and the Key System Transit Company, Oakland, Cal., by which the electric trains of both companies will use joint tracks on Webster Street in Oakland, now used by the Key System. This means the abandonment of the tracks on Franklin Street and the old Franklin Street station, long an object of protest on the part of the city authorities. This station is located in the heart of Oakland's business section and its removal has been repeatedly demanded. The new terminal will be farther down town on Second Street. Several legal obstacles remain to be smoothed out before the new plan is put into operation, but the State Railroad Commission is expected to aid in hastening the change.

Line Abandoned. — The Interstate Public Service Company is taking up its Charlestown Avenue tracks in New Albany, Ind., rather than spend $25,000 for new rails in the rebuilding of the street. The company contended that financial conditions do not warrant the outlay.

Ready to Give Up Line.—The Worcester Consolidated Street Railway, Worcester, Mass., has virtually decided to abandon the Worcester to Spencer line according to Henry C. Page, general manager, who says that the line will quit just as soon as the legal steps necessary for abandonment can be taken. The competition of jitneys with the railway between the two places has hurt the earnings.

Railway Line Leased. — The Wellsburg, Bethany & Washington Railway, Wellsburg, W. Va., has been leased by the Buffalo Collieries Corporation, Scottdale and Monessen, Pa. The deal calls for the option of five years extension, a further option of purchase and a rental of $10,000 yearly, payable quarterly. Extensive repairs are to be made in accordance with the terms of the agreement under which the traction line is taken over. The leasing company is to expend $10,000 on improvements during the first year and $25,000 a year every year thereafter. The leasing corporation, known as the Buffalo Valley Railway, is a subsidiary of a large coal company, owning most of the rich coal deposits in the Buffalo Creek Section. The deal, it is believed, will eventually result in the opening of a coal field in the Buffalo Creek district near Wellsburg.

Personal Items

R. R. Lukens at Covington

Ralston R. Lukens, new superintendent of tracks and structures of the Cincinnati, Newport & Covington Railway, Covington, Ky., comes to that company with many years of practical experience with electric railways throughout the country. For the past five years Mr. Lukens was superintendent of ways and structures of the Pennsylvania-Ohio Electric Company, with headquarters at Youngstown, Ohio. Prior to that he was superintendent of maintenance of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., for six years, and before that was connected with the Chicago City Railway, Chicago, Ill., for four years as assistant engineer. Mr. Lukens was born in Philadelphia. He is an engineering graduate of Lehigh University. Since leaving school he has been identified continuously with electric railway companies. As superintendent of tracks and structures of the Cincinnati, Newport, & Covington Railway, he has general supervision over properties scattered over half a dozen Northern Kentucky municipalities. Mr. Lukens succeeded W. T. Rossell, who has accepted the position of roadway engineer of the Pittsburgh Railways, Pittsburgh, Pa.

R. R. Lukens

Railway and Bus Personnel Separated

Grayson M.-P. Murphy, chairman of the executive committee of the Interborough Rapid Transit Company, New York, which operates subway and elevated lines, on Aug. 19 announced his withdrawal from the Interborough entirely and his acceptance of the chairmanship of the board of directors of the Fifth Avenue Coach Company.

Frank Hedley, president of the Interborough, resigned at the same time as a director of the coach company, as did W. Leon Pepperman, vice-president of the Interborough.

Mr. Murphy gave as the reason for his resignation the fact that he believes that the coach company and the Interborough might soon be in active competition. He held at the same time that the development of a comprehensive system of buses was essential to the solution of the present transit situation.

J. B. A. Forsburg, a member of Mr. Murphy's firm, Grayson M.-P. Murphy & Company, was elected a director of the coach company, as was John A. Ritchie, president of the Chicago Motor Coach Company, formerly president of the Fifth Avenue Coach Company.

Incidentally it should be mentioned that a proposal for the extensive operation of new bus lines in New York City was presented to the Board of Estimate on Aug. 20 by the Fifth Avenue Coach Company, now operating the Fifth Avenue buses. It provides for thirty-four new routes in three boroughs, adding 116 miles to the present system of the company. A feaure of the proposal will be provision for the recapture of the new lines by the city. The matter has been laid on the table by the Board of Estimate and probably will not be taken up for action until the meeting on Sept. 26, following the summer adjournment.

Edward Quincy Brown, superintendent of transportation of the Jacksonville Traction Company, Jacksonville, Fla., for several years, has been selected by J. P. Ingle, general manager, to fill a new position with the company synonymous with that of commercial manager in most light and power organizations. Mr. Brown's duties will all lead to the same end, that of increasing the business of the traction company by studying the needs and wants of the public and satisfying them as far as possible. His title has not been decided upon, but Mr. Brown will serve in the capacity of a "contact man" between the company and the public. In his new position Mr. Brown will handle all of the company's advertising, edit *Trollicar Topics*, hear complaints, and receive suggestions that are made in the interest of better service. He will also determine what special service the company shall give for the benefit of the public. Mr. Brown has been with the Jacksonville Traction Company since March, 1918. He is an alumnus of Georgia School of Technology. A successor to Mr. Brown as superintendent of transportation has not yet been named.

C. L. Lammers, for many years with the Broadhead companies, Jamestown, N. Y., has been appointed superintendent of the Jamestown Street Railway, Jamestown, Westfield & Northwestern Railway and the Chautauqua Traction Company in charge of traffic. He succeeds George L. Maltby, who resigned recently to enter the automobile business as referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 16, 1924.

George A. Mills, for the past six years general superintendent in charge of the Northern States Power Company property in Eau Claire, Wis., has resigned to become connected with the public service enterprises at Kewanee, Ill. These include the properties of the Consolidated Light & Power Company in Kewanee, Neponset, Sheffield and Galva, the municipal plant built by the city of Kewanee and the street and interurban properties.

Charles Mulhado has retired as president of the Gardner-Templeton Street Railway, Gardner, Mass. He plans to establish himself as an industrial engineer in Boston. Mr. Mulhado organized the company following receiver's sale of the Northern Massachusetts Street Railway on Jan. 1. Ralph Kelly has also retired as clerk and treasurer.

W. G. Strait, formerly of the Interborough Rapid Transit Company, New York, N. Y., has been promoted to the position of purchasing agent and general storekeeper of the New York Railways, New York City. Mr. Strait went to the Interborough on Dec. 1, 1903, as a stenographer in the office of J. S. Doyle, superintendent of car equipment. He was, in time, promoted to the positions of chief clerk, superintendent of economy and now he is assuming his new duties as purchasing agent and general storekeeper of the New York Railways.

S. A. Bishop, general claim agent of the Pacific Electric Railway, Los Angeles, Cal., was elected president of the Pacific Claim Agents' Association, at the convention held recently in Spokane, Wash.

C. E. Bell, who has been superintendent of the gas department of the Columbus Electric & Power Company, Columbus, Ga., and of the meter department of the lighting and power system, has been appointed to succeed to the duties relinquished by B. T. Longino as superintendent of the railway department of the company. Mr. Bell is a Kentucky man. He became connected with the local utilities at Columbus five years ago as manager of the gas department. He has already assumed his additional duties under a consolidation of the two departments as heretofore arranged.

Berryman T. Longino, for the past four and a half years superintendent of the railway department of the Columbus Electric & Power Company, Columbus, Ga., has been appointed general superintendent of the Eastern Texas Electric Company, Beaumont, Tex. Both companies are controlled by Stone & Webster. The Eastern Texas Electric Company, serves both Beaumont and Port Arthur with power and lighting service and operates an interurban service between the cities and the local railway service in them. Mr. Longino was graduated from the Georgia School of Technology in 1907. Following graduation he spent one year in the office of Stone & Webster. He was transferred to the Seattle Electric Company, Seattle, Wash., where he spent two years in the car shops and the transportation department. From 1909 to 1913 he was assistant superintendent of the Tacoma Railway & Power Company. He left the railway business to engage in banking, but in 1914 returned to the railway field with the Jacksonville Traction Company. Later he went with the Columbus Electric & Power Company.

L. R. Ross, former president of the New Brunswick Power Company, St. John, N. B., has been superannuated as terminal agent of the Canadian National Railways.

Homer Loring was elected chairman of the executive committee of the Boston & Maine Railroad on Aug. 19. Mr. Loring will assume charge of the road's finances and corporate matters at once, and by the end of the year will retire as chairman of the Massachusetts State Finance Commission. The Boston & Maine Railroad operates both the Portsmouth Electric Railway and the Concord Electric Railway. Mr. Loring is, perhaps, best know to electric railway executives as the former chairman of the trustees of the Eastern Massachusetts Street Railway. He it was who did most, perhaps, to secure the passage of the remedial legislation of 1918 under which the Bay State Street Railway was successfully reorganized.

Miss Lois M. Anderson, employed for the past year and a half in the Fowler, Ind., office of the Interstate Public Service Company, has accepted the position of assistant to the director of public relations in the company's office in Indianapolis. She will also assist Mrs. P. W. Evans in carrying out the program of the Women's Public Information Committee.

M. Graham Fulton, treasurer of the Mexico Tramways for a number of years, has resigned to accept a similar position in Brazil in connection with the companies controlled by the Brazilian Traction, Light & Power Company, Ltd. F. Wood, who has been for many years in the service of the Mexican Light & Power Company, Ltd., has been promoted to fill the position left vacant by Mr. Fulton's resignation. The headquarters of both the Brazil and Mexico companies are in Toronto, Canada.

Daniel E. Lenahan has been appointed superintendent of car equipment of the New York Railways, New York City. Mr. Lenahan began his railroad career on Dec. 22, 1902, as a foreman carcleaner with the Interborough Rapid Transit Company, New York. He was in turn promoted to assistant carhouse foreman, power house foreman, general foreman. Then he went to the New York Railways as assistant general foreman and superintendent of the electric department. He returned to the Interborough as superintendent of inspections, and has now been promoted to superintendent of car equipment of the New York Railways.

A. R. Frahm has been appointed general superintendent of the local properties of the Northern States Power Company at Eau Claire, Wis., to succeed George A. Mills. These properties include more than 30 miles of electric railway. Mr. Frahm was formerly engaged in utility work at Grand Forks, N. D.

Obituary

Daniel Anderson Tomlinson

Daniel Anderson Tomlinson, manager of the railways bureau of the Portland Cement Association, Chicago, died on Aug. 7 while playing tennis at Evanston, Ill. Mr. Tomlinson joined the staff of the Portland Cement Association in 1920. Two years later he was promoted to the position he held when he died.

Mr. Tomlinson was born in Detroit in 1890. After a year at Lake Forest College he went to Massachusetts Institute of Technology, from which he was graduated in 1912. Later he took a special course at Armour Institute. For five years thereafter he was with the Chicago & Western Indiana Railroad as assistant engineer engaged in track elevation work, yard construction, valuation and studies on terminal facilities. He served in the Illinois National Guard on the Mexican Border and during the World War he was adjutant to the constructing quartermaster at Camp Grant, instructor at the officers' training camp there and at the coast artillery school at Fort Monroe, Va. He was discharged in 1919 as a captain of Coast Artillery.

For a few months he was manager of the Central Zone, professional and special section of the U. S. Employment Service, helping engineers get back into civilian work. Then for a year he served as assistant secretary of the American Association of Engineers, in charge of railroad and employment work.

Richard Eick, purchasing agent for the Arkansas Central Power Company, the successor of the Little Rock Railway & Electric Company, Little Rock, Ark., died on Aug. 11, after a long illness. Mr. Eick has spent all his life since manhood in the service of public utilities. He was born on Nov. 2, 1873, at Califou, N. J., and entered railroad work with the Public Service Railway at Newark, N. J. in 1897. A year later he was promoted to be superintendent of the Elizabeth division. He resigned in 1904 to accept a position as superintendent of transportation with the United Railways, San Francisco, Cal. In 1906 he resigned to accept a position with the Little Rock Railway & Electric Company. In 1917 he was promoted to the position of purchasing agent. Mr. Eick is survived by his wife and six daughters.

James B. Peck, for many years attorney for the Kansas City Railways, died at his home in Kansas City on Aug. 12. Mr. Peck went to Kansas City from Kentucky twenty-four years ago. He enrolled in the Kansas City School of Law and after graduation remained there to practice law. He was fifty-one years old.

Thomas Wood, pioneer electric railway builder, died recently at his home in Sandusky. He had charge of the construction of the line from Sandusky to Lorain which was formerly called the Sandusky & Interurban and which is now a part of the Lake Shore Electric System.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Bus Heaters in Demand

Orders received by the N. A. Petry Company of Philadelphia for Petry heating valves to be installed on buses have been in such large volume that the company is now considering enlarging its manufacturing force in order to supply the demand. Among the users of this heating device are the Yellow Coach Manufacturing Company, the International Motor Company, the Fifth Avenue Coach Company, the Garford Motor Truck Company and the General Motors Truck Company.

Honors Long-Service Employees

The Taylor-Wharton Iron & Steel Company recently held a celebration in honor of its employees longest in the service. The company has at its plant in High Bridge, N. J., 221 employees who have been in service more than fifteen years; ninety-nine who have served a quarter of a century or more, thirty who have been there thirty-five years; thirteen with more than forty-five years service and eleven with more than fifty years service. Testimonials were presented to these men in recognition of their work.

Demand for Southern Yellow Pine on Increase

Many of the woods formerly used for poles are becoming scarce. The longer lengths are not only difficult to obtain but they are expensive. As it takes from 50 to 150 years to grow a pole-sized tree of these varieties compared with only 30 to 50 years to grow a southern yellow pine tree of suitable size, it is natural that the latter should gain in popularity. This wood is not only readily available, but it has physical properties which fit it well for use in poles.

Data concerning the strength of pine poles, correct methods of applying preservative treatment, and specifications describing desirable physical properties in a pole are given in a booklet recently published by the International Creosoting & Construction Company, Galveston, Texas. This 32-page booklet is attractive in form. It contains many illustrations, and much information of value to pole users. Charts are included which show a steadily increasing number of poles chemically treated. A supply of poles of standard sizes is carried on hand at all times by this company.

Metal, Coal and Material Prices

Metals—New York	Aug. 19, 1924
Copper, electrolytic, cents per lb.	13.562
Copper wire base, cents per lb.	15.50
Lead, cents per lb.	8.05
Zinc, cents per lb	6.60
Tin, Straits, cents per lb.	52.625
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.15
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	1.875
Franklin, Ill., screenings, Chicago, net tons	1.85
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.55
Weatherproof wire base, N.Y., cents per lb.	18.50
Cement, Chicago, net prices, without bags	2.20
Linseed oil (5-lb. lots), N.Y., per gal.	$1 07
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	10.12
Turpentine (bbl. lots), N. Y., per gal.	$0.91

Rolling Stock

Municipal Railway of St. Petersburg, St. Petersburg, Fla., has announced specifications for seven Birney cars and eight double-truck one-man safety cars recently ordered from the J. G. Brill Company. An interesting feature of these cars is that all the woodwork below the top sash will be treated by the G. W. Saums wood preservative process. The specifications for the double-truck cars follow:

Date order was placed	July 14, 1924
Date of delivery	Nov. 15, 1924
Builder of car body	J. G. Brill
Type of car	Double truck safety
Seating capacity	48
Weight:	
Car body	12,780 lb.
Trucks	9,760 lb.
Equipment	6,900 lb.
Total	29,440 lb.
Bolster centers, length	18 ft.
Length over all	40 ft. 1 in.
Truck wheelbase	5 ft. 1½ in.
Width over all	8 ft. 5 in.
Height, rail to trolley base	11 ft.
Body	Semi-steel
Interior trim	Mahogany
Roof	Arch
Air brakes	Three cars Westinghouse Four " G. E. Co.
Armature bearings	Sleeve
Axles	4-in. A.S.T.M. Spec. A-20-21
Bumpers	Brill reinforced channel
Car signal system	Faraday
Car trimmings	Bronze
Center and side bearings	Brill standard
Conduits	Sheraduct
Control	K-35
Couplers	Plain bar
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Destination signs	Hunter
Door operating mechanism,	National Pneumatic
Fare boxes	Johnson
Fenders	H. B. Lifeguard
Gears and pinions:	Three cars Westinghouse helical Four " G. E. spur
Hand brakes	Brill
Heater Equipment	None
Headlights	Golden Glow
Journal bearings	Bronze babbitted
Journal boxes	Brill standard
Lightning arresters:	Three cars Westinghouse K-3 Four " G. E. M. D.
Motors	Three cars Westinghouse 506 Four " G. E. 264
Motors	Inside hung
Paint	St. Petersburg grey

Educators Studying Electrical Industry at First Hand

The Westinghouse Electric & Manufacturing Company has just completed its fourteenth annual summer course for professors of electrical engineering. The group is here shown standing beside one of the new electric locomotives being built at East Pittsburgh, Pa., for the Norfolk & Western Railroad. This course is planned with a view to securing closer contact between teaching of electricity in schools and colleges, and the working of the electrical industry.

Sash fixtures	Brill Renitent
Seats	Brill Waylo
Seating material	Rattan
Slack adjuster	Gould
Springs	Half-elliptic and coil
Step treads	Feralun
Trolley catchers	Earl
Trolley base	Simplex No. 3
Trolley wheels	Ideal 4 in.
Trucks	Brill 77 E-1
Ventilators	Brill exhaust
Wheels	26-in. cast iron
Special devices:	Fish pole carriers on side of car; rotary gongs, trombone 13-in. whistle.

The single-truck cars will weigh only 16,000 lb. and will have an over-all length of 28 ft. ½ in.; the width over all will be 7 ft. 10⅝ in. and the height, from rail to trolley base, will be 10 ft. 9 in.

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Worcester Consolidated Street Railway, Worcester Mass., is transforming its entire equipment into one-man cars. The work is being done in the company's own shops at something less than $100 for each car. The company has 287 cars and the number that can be operated as one-man cars is now 167. General Manager Page has stated that the cars will not necessarily be operated as one-man cars, but that they can be if that type of operation becomes desirable or necessary.

Union Traction Company of Indiana, Anderson, Ind., has announced specifications on the 15 new steel combination passenger and baggage cars referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 16. These cars are to be arranged for single end operation and will be equipped with stationary seats. The control equipment will be Westinghouse HL so that the units may be operated in trains if desired. Detailed specifications follow:

Date order was placed	July 28, 1924
Date of delivery	February, 1925
Builder of car body	St. Louis Car Company
Type of car	Passenger-baggage
Seating capacity	54
Weight:	
Car body	49,000 lb.
Trucks	24,000 lb.
Equipment	17,000 lb.
Total	90,000 lb.
Bolster centers, length	38 ft. 6 in.
Length over all	61 ft. 0 in.
Truck wheelbase	7 ft. 0 in.
Width over all	9 ft. 1 in.
Height, rail to trolley base	12 ft. 11 in.
Body	Steel
Interior trim	Mahogany
Headlining	Steel
Roof, arch	Steel, wood and canvas
Air brakes	Westinghouse
Armature bearings	Plain
Axles	Union Traction standard
Bumpers	12 in.
Car trimmings	Union Traction standard
Center and side bearings:	Standard Motor Truck Company
Control	Westinghouse HL
Couplers	Radial
Curtain material	Pantasote
Destination signs:	Union Traction standard
Fenders	Union Traction standard
Gears and pinions	Westinghouse helical
Hand brakes	St. Louis Car Company
Heater equipment	Hot water
Headlights	Golden Glow
Journal bearings	Plain 5 in. x 9 in.
Journal boxes	5 in. x 9 in.
Motors	Four Westinghouse 333 VVD, Inside hung
Seats	Stationary
Seating material	Plush and leather
Springs	Standard Motor Truck Company elliptic and coil
Step treads	Kass safety
Trolley retrievers	Ohio Brass
Trolley base	Westinghouse
Trucks	Standard Motor Truck Company
Ventilators	Utility
Wheels	Rolled steel Union Traction
Power saving device	Economy Meters

Chicago Rapid Transit Company, Chicago, Ill., has sent out inquiries for bids on the construction of 100 new steel elevated cars which are to be similar in construction to the last group of 100 cars recently put in service. Bids are due Sept. 10.

Track and Line

Toronto, Can.—At a special meeting of the Toronto Transportation Commission on Aug. 14 the agreement was executed between it and York Township for the construction and operation of car lines in the township by the Commission. The streets in the township which figure in the agreement are Oakwood Avenue, Eglinton Avenue, Rogers Road, and that section of Dundas Street between Runnymede Road and Lambton. Tenders for the construction work in connection with the agreement will be received by Aug. 25. Lines will be placed on Oakwood Avenue between St. Clair and Eglinton Avenues, a distance of 1¼ miles.

Warren Street Railway, Warren, Pa., now a part of the Penn Public Service Company, has placed an order with the Lorain Steel Company of several special pieces of track work which include switches, frogs, curves and branchoffs. Since the operation of the railway by the Penn Public Service, thousands of dollars have been spent in rehabilitating tracks, roadbed and rolling stock. In the last four months more than 8,000 cross ties have been replaced which, alone, cost in the neighborhood of $12,000.

New Brunswick Power Company, St. John, N. B., will relay 2 miles more of tracks before winter. Recently, the company relaid a half mile of track on what is known as the Fairville line. Orders have been placed for 80-lb. rail. It is estimated that the work will cost approximately $50,000. The new rails will be laid on the western side of St. John harbor.

Alabama Power Company, Montgomery, Ala., will complete a new paving project in Cloverdale about Sept 1. The work began some weeks ago and is of high grade concrete.

South Jacksonville Municipal Railway, South Jacksonville, Fla., has reported progress on the Fletcher Park extention. The rails will be laid on the parkway alongside Atlantic Boulevard.

Spokane United Railways, Spokane, Wash., is rebuilding the tracks on Thirteenth Avenue between Wall and Stevens Streets and for one block on Stevens. The job includes 885 ft. of rebuilding work. This will include the installation of 7-in., 70-lb. T-rail and 7-in., 108-lb. grooved girder rail on the three curves in this area and the installation of new 4½-in., 60-lb. T-rail straight track. This job was started July 7 and will soon be ready for paving.

New Incorporation

Seabrook Electric Railway, Houston, Tex., has been incorporated with a capital stock of $1,000,000 to construct an interurban line between Houston and Seabrook, via Harrisburg, Pasadena, San Jacinto Battle Park, Morgan's Point, along the south side of the Houston Ship Channel, thence along bay shore via Bay Ridge, La Porte and Red Bluff. The headquarters of the company are to be in Houston. The directors are John H. Kirby, J. M. West, W. C. Munn, Joseph Rice, John S. Bonner, J. A. Cottingham, John H. Thompson and Jacob F. Wolters, Houston, and D. C. Giddings, Brenham.

Power Houses, Shops and Buildings

Milwaukee Northern Railway, Sheboygan, Wis., has completed negotiations with the Wisconsin Power & Light Company for the joint use of the new $75,000 terminal in Sheboygan. As a future development to supplement its passenger station business, plans are under consideration to build a freight depot when this part of the business is sufficiently developed.

Los Angeles Railway, Los Angeles, Cal., has called for bids for an addition to the bus and automobile storage facilities. The entire ground floor space will be devoted to storage of motor vehicles. The building will be of brick construction throughout.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, is building a $15,000 addition to its plant in Findlay to provide for increased power business.

New Advertising Literature

Electric Railway Improvement Company, Cleveland, Ohio, has just issued a new descriptive circular picturing the full line of its well known "Erico" electric weld, brazed type, rail bonds. In addition to illustrations and data on the use of the various types of brazed bonds, many tables are given showing practically every dimension of each bond size.

Electric Railway Equipment Company, Cincinnati, Ohio, is distributing a folder whch shows in a convincing manner the improvement which has been effected in the appearance of the streets of Montgomery, Ala., by the instalaltion of "Elreco" poles. Twelve pictures are used, six taken before the change was made and six taken at the same points afterward. The installation in Montgomery was made during the early part of the present year and the inauguration of the new system of street lights on April 4 was the occasion of impressive ceremonies.

Electrical Alloy Company, Morristown, N. J., has issued a pamphlet describing its welding rods, wires and strips. Information is given in regard to the characteristics of nickelchrome wire and the advantages of using this in certain work.

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High braking power is needed for safety cars. In fact the auxiliary hand brake should be equal to the air brake in power.

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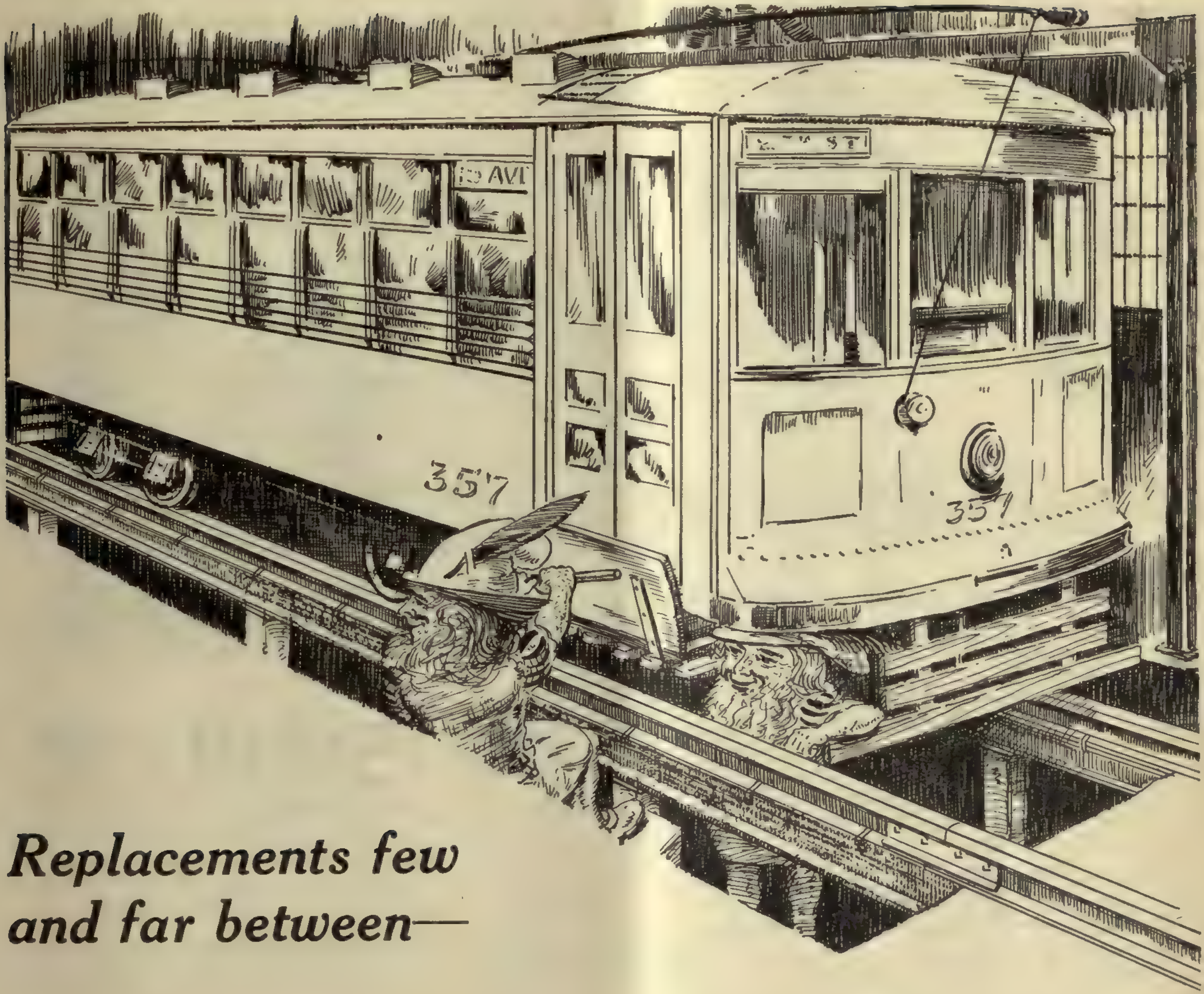

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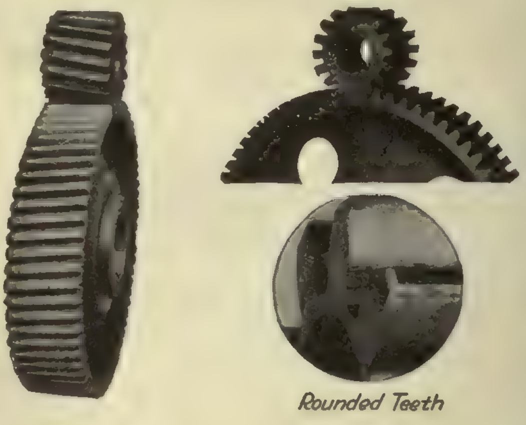

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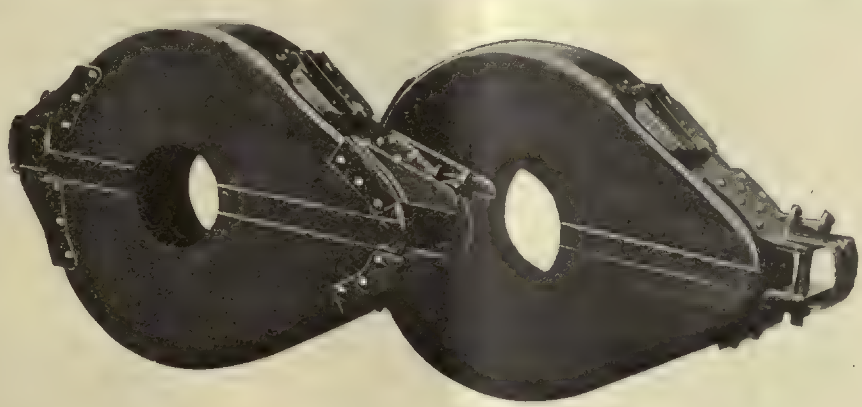

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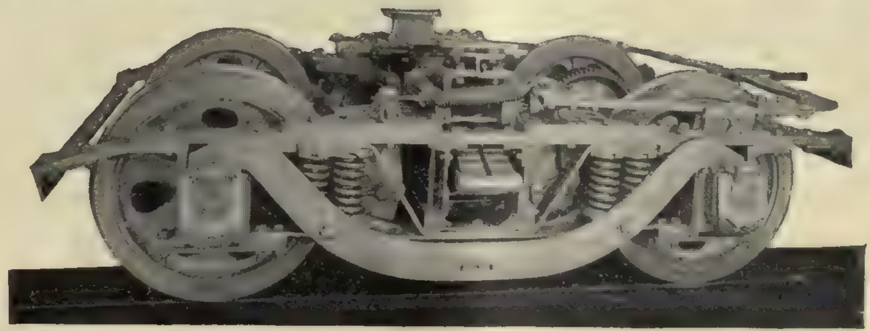

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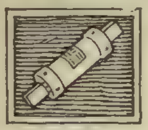
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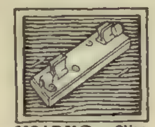
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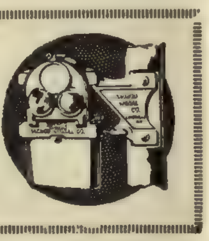

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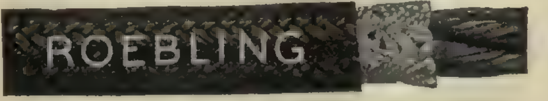

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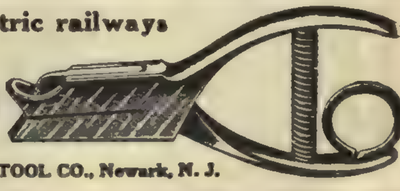

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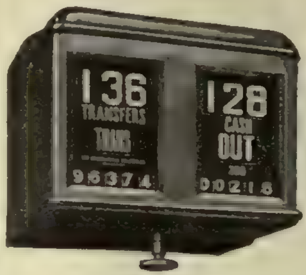

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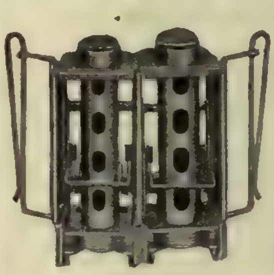

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CONSOLIDATED CAR-HEATING CO.
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HEAT TREATED CAR AXLES
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Experienced in steam and electric railway car design and details. Give experience and salary desired.

P-728, Electric Railway Journal
10th Ave. at 36th St., New York, N. Y.

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Practically Like New
BIG SAVING
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For Sale—Built in 1920
2—Kuhlman Semi-Steel Interurban Cars, Passenger, Smoker and Baggage.
Length 54-ft. 7¼-in.; width 8-ft. 6-in.
Brill 27 MCB 2 Trucks.
4 G. E. 203 motors. Complete.
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

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WANTED all around experienced control man, competent to shoot trouble and maintain Westinghouse H L F general electric types M and K control on Southern California property. Must give references and experiences. P-730, Electric Railway Journal, 883 Mission St., San Francisco, Calif.

WANTED all around truck and machine shopman to organize and supervise truck and machine shop on Southern California property operating approximately thirty autos and trucks. Must give references and experiences. P-731, Electric Railway Journal, 883 Mission St., San Francisco, Calif.

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GENERAL line foreman, experienced on city and high speed interurban work. PW-726, Electric Railway Journal, 10th Ave. at 36th St., New York.

MASTER mechanic, now employed, desires to make change. 20 years' broad experience on city and interurban lines. Also thoroughly up-to-date on bus maintenance. Have proven record of successful and economical operation, and can furnish best of references from men high in electric railway field. PW-732, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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YOUNG man experienced as inspector, time table and chief clerk, would like to make change. Prefer South or midwest. PW-729, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

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Position With Investment

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World's Largest Distributors of Rails

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5—Brill One Man, Two Man Cars, 28 passengers, newly repainted green enamel. Brill 21-E trucks, 33-in. wheels, 2¼-in. face, West. 12-A motors.

4,000 ft. number 2 nought Weatherproof Cable.

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10 ALL STEEL CARS

Practically New

Length over bumpers	50 ft. 10 in.
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Width over all	8 ft. 7 in.
Height over all	11 ft. 7½ in.

Cars are complete and ready for operation including WH air brakes. Seat 52 people.

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Standard 050 4 ft., 10-in. wheel base.

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New **Relaying**

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BOLTS
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RAIL
BRACES

All Rails and Track Materials shipped subject to inspection and approval at destination.

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WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Standard Steel Works
Westinghouse E. & M. Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
Gilbert & Sons B. F. Co., A.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Baldwin Locomotive Works
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Boilers
Babcock & Wilcox Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

Boxes, Switch
Johns-Pratt Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

Brushes, Graphite
U. S. Graphite Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
International Motor Co.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Cables. (See Wires and Cables.)

Cambric Tapes, Yellow and Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heati'g Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Irving Iron Works

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
St. Louis Car Co.
Standard Steel Works

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.

Coils Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

Concrete Flooring Surface
Irving Iron Works

Concrete Reinforcing Bars
Laclede Steel Co.

Condenser Papers
Irvington Varnish & Ins. Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
St Louis Car Co.
Westinghouse Tr. Br. Co.

Cranes
American Engineering Wks.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Transit Equipment Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car H't'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.

Electrodes, Carbon
Railway Track-work Co.
Rail Welding & Bonding Co.

Electrodes, Steel
Railway Track-work Co.
Rail Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Cyclone Fence Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

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Elec. Service Supplies Co.

Flooring, Fireproof
Irving Iron Works

Flooring, Non-Slipping
Irving Iron Works

Flooring Open Steel
Irving Iron Works

Flooring Steel Subway
Irving Iron Works

Flooring Ventilating
Irving Iron Works

Forgings
Brill Co., J. G., The
Standard Steel Works

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Fuses and Fuse Boxes
Consolidated Car Heati'g Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Cartridge, Non-Refillable & High Voltage
Johns-Pratt Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

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Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co

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Brill Co., The J. G.
St. Louis Car Co.

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Brill Co., J. G., The
Standard Steel Works

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Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.
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Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

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General Electric Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Bethlehem Steel Co.
Lorain Steel Co.

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Grating, Steel Subway
Irving Iron Works

Greases (See Lubricants)

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Railway Track-work Co.

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Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Bricks and Wheels
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Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

Heaters, Car (Electric)
Consolidated Car Heati'g Co
Gold Car Heat. & Ltg. Co.
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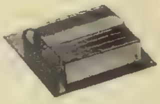

Type "C"

The Southwestern car shown above is equipped with N-L Type "C's"

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THE MOST MODERN and EFFICIENT AIR TOOLS

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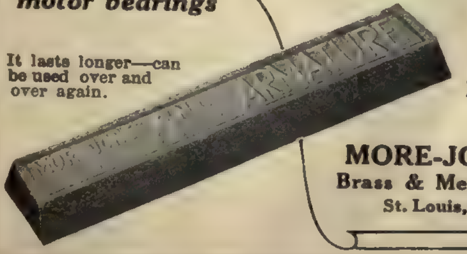
M-J

ARMATURE BABBITT
—for railway motor bearings

Scientifically compounded of pure new tin, copper, antimony and metallic nickel—no lead.



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Tough
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Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

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Co.
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Insulating, Silk & Varnish
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Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co., Inc.

Jacks (See also Cranes, Hoists and Lifts)
Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

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Brill Co., J. G.
St. Louis Car Co.

Junction Boxes
Std. Underground Cable Co.

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General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
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Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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McGuire-Cummings Mfg. Co
St. Louis Car Co.
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Galena Signal Co
Universal Lubricating Co.

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Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel, Special Track Work
Bethlehem Steel Co.

Manganese Steel Switches Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Bethlehem Steel Co.
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Oils (See Lubricants).

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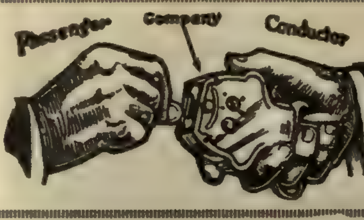

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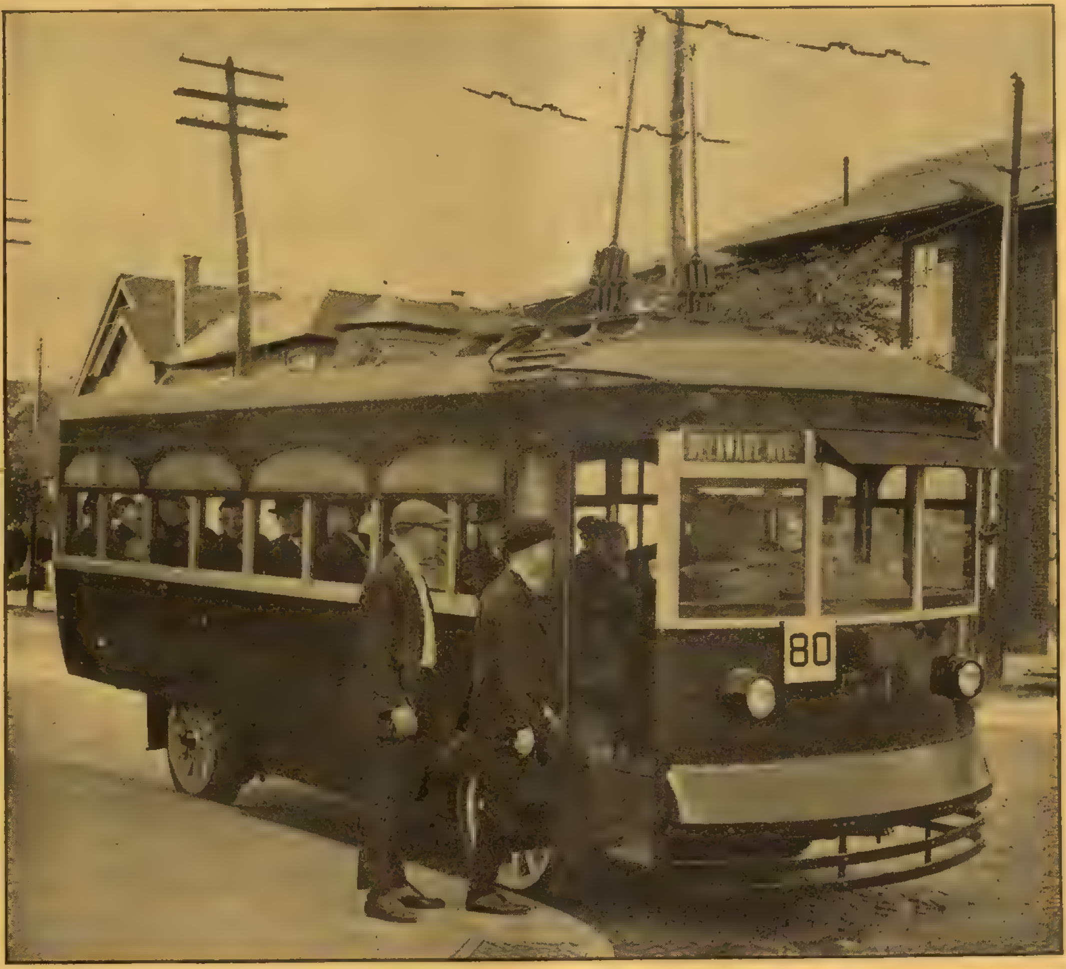

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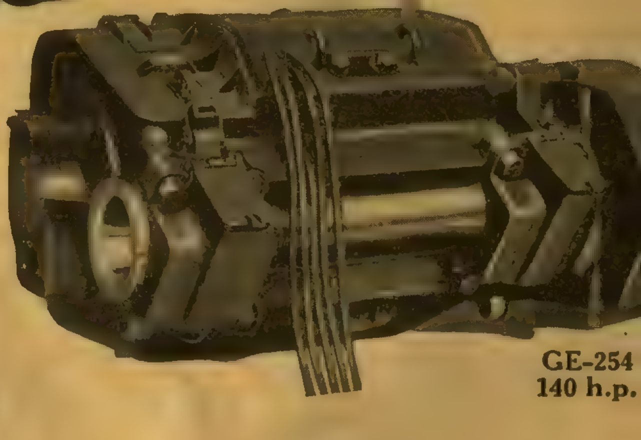

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Electrical Retailing
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

Knowing Where to Look

USEFUL knowledge consists not only in being familiar with established facts but also in knowing where to look for those facts which it is impossible to carry constantly in mind. Not many of us are able, like the man in the familiar advertisement, to recall in a flash all the names, places, dates and other details connected with a particular incident in the past. But we should know where to look for such information as may have faded from our memories.

If it is a matter concerning the electric railways, a small thing or an important event, of recent date or long ago, the back numbers of ELECTRIC RAILWAY JOURNAL usually contain the information. It is surprising how seldom, when information is sought on some subject connected with the industry, that full details cannot be found in the pages of this paper.

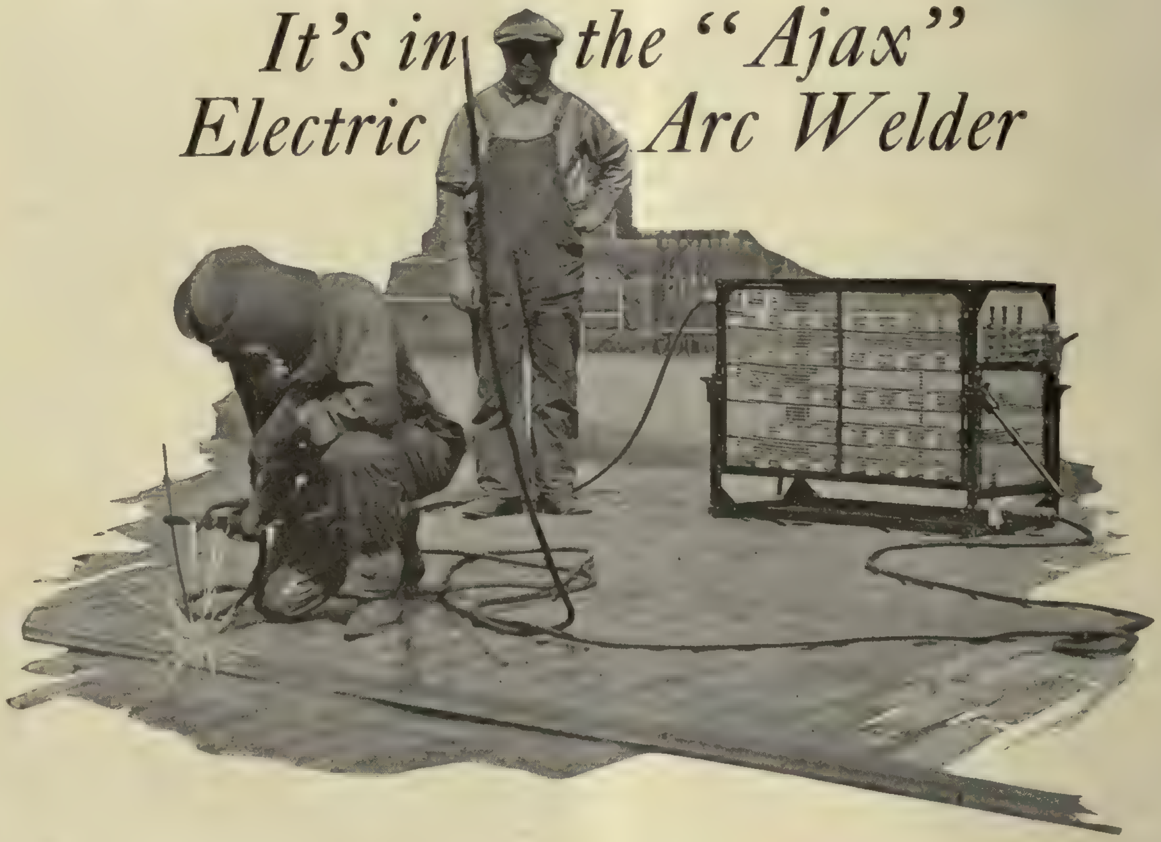
Because the editors cannot tell offhand the exact issue in which a particular article appeared, we have a comprehensive index and in a short time anything which has ever been published in the 64 volumes of ELECTRIC RAILWAY JOURNAL, covering a period of 40 years, can be located. This is a service which we render frequently to our readers who do not themselves have at hand old volumes and a complete index, and we are always glad to do it for them.

Number of Copies Printed, 6,175

Advertising Index—Alphabetical, 40; Classified, 36, 38; Searchlight Section, 35

The Secret of Good Welding

It's in the "Ajax" Electric Arc Welder



NO matter how good the equipment, you can get a good weld only with good work by the welding crew. But even a good crew can make lasting welds economically only with adequate welding equipment. Hence the importance of knowing the Ajax welder. Consider its fine points:

Take current capacity first. Ajax will give you 209 amperes even at 300 volts, which is the maximum capacity of other welders at 550 volts. "Ajax" has regulating switches which provide a range of current from 19 to 333 amperes at normal line voltage with intermediate steps of 18 amperes each. You get ample capacity for adequate penetration even where the voltage drop is 50%. And that in a light-weight outfit—120 lbs. for type RWY, 18x28x36 in.

There are other good points such as simple circuits all exposed to view, non-oxidizing resistance wire, ample ventilation, all parts accessible, a shunt switching device that insures large currents even where voltage is much below normal.

Finally—price—you'll be agreeably surprised when we tell you how low it is. Do you know? Ask us.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London
Electrical Engineering & Mfg. Co., Pittsburgh

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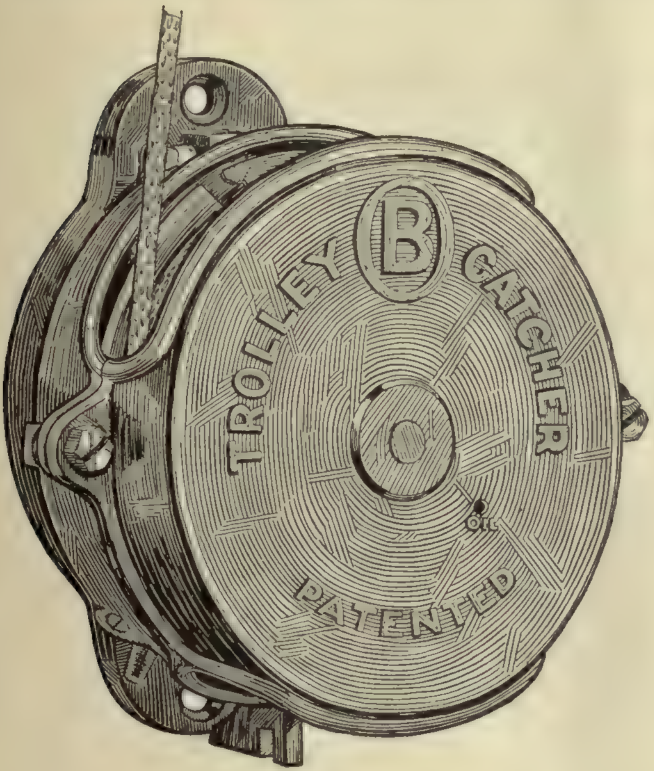


The Trolley Pole's Boss

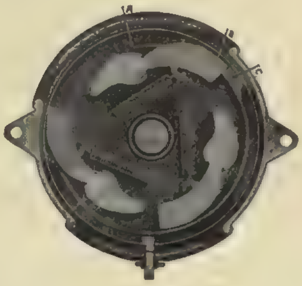
It's those troublesome spots in your overhead lines that call for O-B Trolley Catchers. The unusual curves, and the cars of varying length, that make sure trolley wheel passage difficult even with the most carefully located trolley line, call for a reliable trolley catcher.

A "Boss" that goes on the job without faltering or halfway performance.

An O-B Trolley Catcher will hire out to you on that basis.

Gravity-Operated Reel Latch

When the latch is raised with the finger it instantly locks the reel. At a slight pull on the rope, it drops back, releasing the reel. This is a big help in renewing rope.



No Stepping Up

The three dogs are thrown outward by centrifugal force when the trolley wheel jumps and jerks the rope. One of the dogs slips over the guide A-B, engages the stop at C and prevents further flight of the pole. The rebound of the trolley pole and resultant slack in the rope is not sufficient to let the dog back off the guide A-B. Therefore there is no "stepping up" of the pole.

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS

NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada

TRADE MARK

"STEP LIVELY!"

Cars must be kept on the move to earn maximum returns. Anything which can be done to expedite operation adds to the value and reputation of your service.

Brakes are of the utmost importance in this respect.

Brakes affect car speeds, headways, earning power and dividends.

It is to your advantage to make sure at all times that you are getting the benefit of such braking facilities as are thoroughly modern and best adapted for your particular operating problems.

As the world's oldest and largest power brake manufacturers we can give you valuable assistance in checking up on this part of your equipment. A wire or letter will bring an Air Brake Expert to your door.

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works: WILMERDING, PA.

COMPLETE
AIR BRAKE
EQUIPMENT
for EVERY CLASS
of
SERVICE

Of Special Interest

The Westinghouse Variable Load Brake for surface cars is a development which will be of special interest to all railway men. This brake is the most efficient ever designed for ordinary traction service and offers certain advantages which should be studied by all operating officials. Send for Publication T-2045.

WESTINGHOUSE TRACTION BRAKES

Rail and Paving Renewal in Progress at Midnight on Old Steel Tie-Concrete Foundation, Euclid Avenue, Cleveland

In Cleveland—Now!

Five mile renewal installation in progress

EXTENSIVE installations of the highest development of Steel Tie Track for city streets are now in progress in Cleveland.

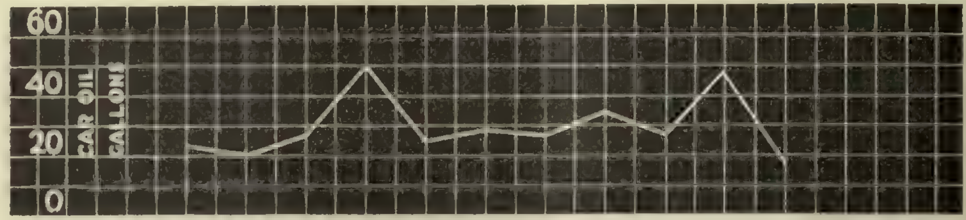
Five miles of renewal work in which new rail and paving are to be put in without disturbing the old steel tie concrete base started this week.

Five miles of new construction with Standard Steel Twin Ties in which complete provision is made for renewal at the end of the rail life is nearing completion. An inspection of the details and investigation of the money saving possibilities of these jobs will be well worth the trip.

The International Steel Tie Company
Cleveland

Steel Twin Tie Track

Economical **Permanent** **Renewable**



—*Like a Lighthouse!*

TEXACO Lubrication Engineers have worked out a system of continuously kept charts, which are of untold benefit to Texaco Customers.

Here's how.

As you might know, when you buy Texaco Lubricants you get Texaco Service.

And one feature of our Service is the charting for you of your "Lubrication Performance."

This chart is kept up and studied by us. And that study enables us to help you in a very concrete way.

Thus, if we find on any road that there is an apparently uncalled increase in oil consumption, a Texaco Lubrication Engineer is sent out to investigate, along with a mechanical official of that road.

Often, of course, there may be valid reasons for the increase in oil consumption, but very frequently we have assisted the operating forces in their effort to secure a prompt stoppage of unnecessary oil leaks.

On the other hand, if the chart shows an unprecedented falling off in lubricating oil consumption, the items are checked and, very often, trouble due to "oil-starved" bearings is forestalled.

The Texaco Lubrication Performance Chart System *is like a lighthouse* to give warning in time.

For we do not step in and try to run your business.

We only give you the benefit of our experience on roads in all parts of the country.

YOU keep the control:

Our Service is advisory.

These charts do not entail any extra clerical work in your office.

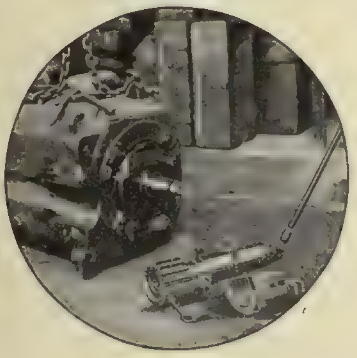
We handle it for you.

We tabulate it.

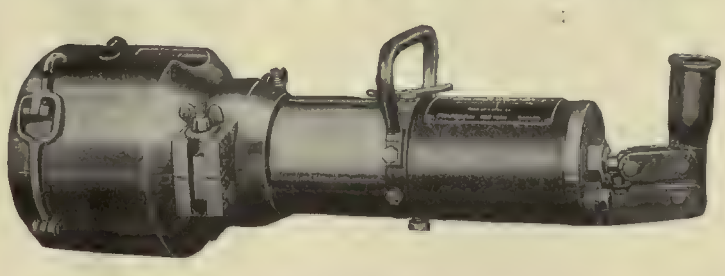
We chart it.

Ask us more about the Texaco Chart System
for Lubrication Performance.

THE TEXAS COMPANY, U. S. A.
Texaco Petroleum Products
ELECTRIC STREET RAILWAY DIVISION
17 Battery Place, New York
OFFICES IN PRINCIPAL CITIES



PEERLESS PINION PULLER



Weight, only 50 lbs.
Convenient handle for carrying

No matter how tight it's frozen on—

even the most stubborn pinion will give way to the Peerless Pinion Puller. Mechanics need this great force to start the pinions from their frozen fit on the shaft.

The Peerless Pinion Puller has been developed to meet this need. Do not waste your time and risk your equipment by hammering. It's dangerous as well as slow.

Use the one-man, portable, hydraulic Peerless. It does the job the efficient way.

Let us demonstrate this equipment

ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA 17th and Cambria Sts.	NEW YORK 50 Church St.	CHICAGO Monadnock Bldg.
PITTSBURGH 829 Oliver Building	SCRANTON 316 N. Washington Ave.	BOSTON 88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

ELECTRIC SERVICE SUPPLIES CO.

International Ties are inspected by experienced timber men, who enforce the A.R.E.A. Specifications rigidly and grade the ties strictly in accordance with them.

No Mystery—Full Confidence

International inspection is an accurate inspection in strict accordance with the A. R. E. A. Specifications, backed by a permanent marking which identifies the grade of the tie at any future time when re-checking may be desired.

There is nothing mysterious about the *International* markings—Five spots represent a grade 5 tie—four spots represent a grade 4 tie—and likewise with Grades 3, 2 and 1.

These markings guarantee to a railroad that it is receiving exactly the ties it specifies without subterfuge, overgrading or deviation in any form.

Full confidence is created only when mystery is eliminated.

The *International* door is wide open. It welcomes a personal investigation and inspection of its plants, facilities and methods.

International Creosoting & Construction Co.
General Office—Galveston, Texas
Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

International
Standard Specification Ties

NATIONAL PNEUMATIC EQUIPMENT

for these Mission Beach Cars

San Diego Electric Railway
chooses from the
National Pneumatic Line

MISSION BEACH, California, has a new electric railway line—actually new construction, new cars, new everything. It's refreshing to hear of 20 miles of new electric railway construction, these days, isn't it?

And it's interesting to note in the specifications for up-to-date cars—*"National Pneumatic Interlocking Safety Door Operating Devices, with National Pneumatic Push Button Control."*

National Pneumatic Co., Inc.

Originators and Manufacturers
Principal Office: **50 Church St., New York**
Philadelphia—Colonial Trust Building
Chicago—McCormick Building
Works—Rahway, New Jersey
Manufactured in Canada by
Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.

Light-of-foot

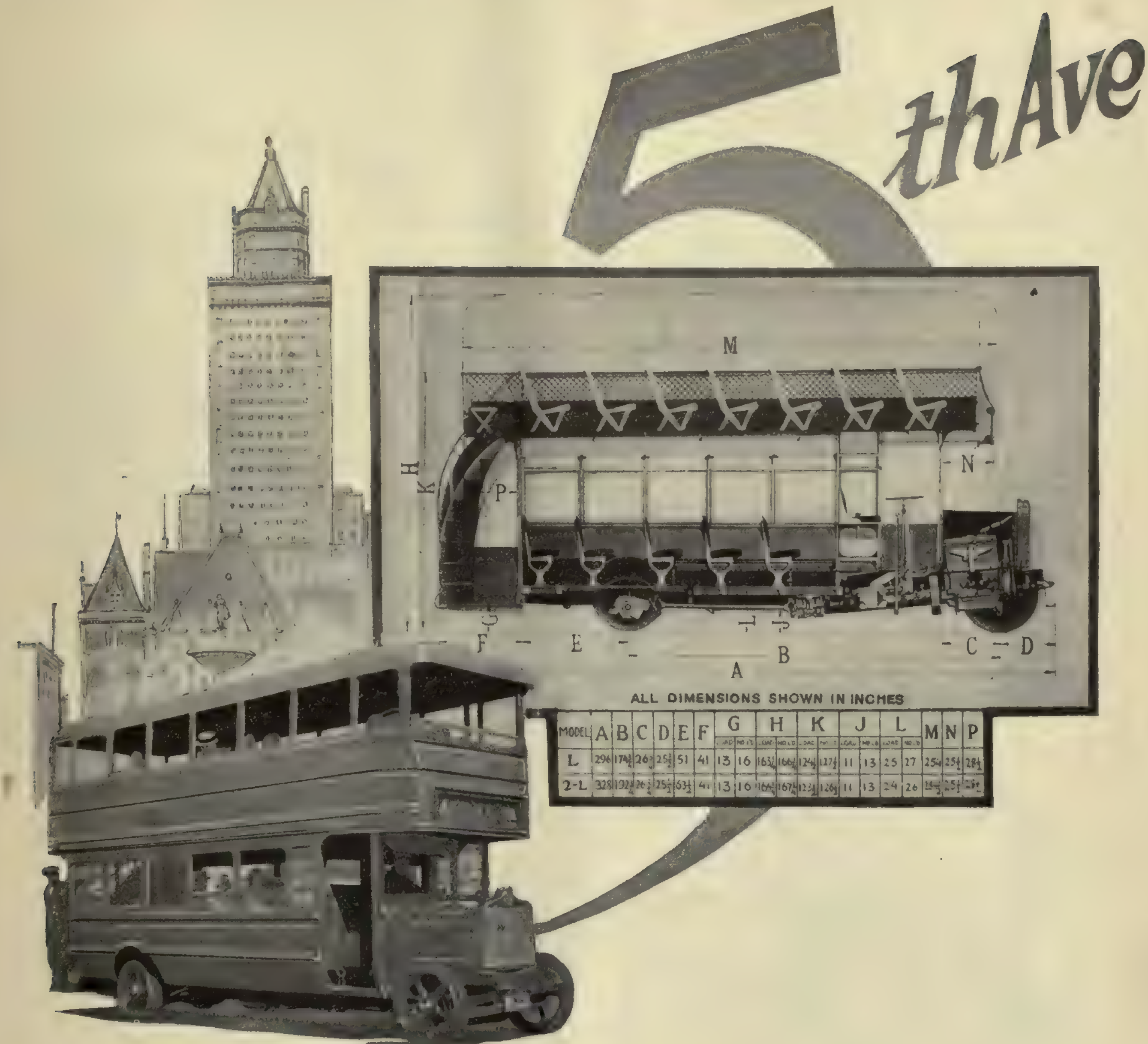
MERCURY, the Grecian god of speed, would have been a sorry messenger for his celestial associates, had his feet been burdened with surplus weight. Instead he was equipped, so the legends say, with lighter-than-air feet.

Lighter-than-air car wheels are quite impractical in these materialistic days of iron and steel. But we can use scientific methods to accomplish material weight reductions.

By a special process of manufacture Davis "One-Wear" Steel Wheels are made from a tough, high manganese steel, super-hardened by heat treatment so that a much lighter wheel is secured without sacrifice of strength. You can figure on a saving in wheel weight when using Davis Wheels under your cars.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
"ONE-WEAR"
STEEL WHEELS



ALL DIMENSIONS SHOWN IN INCHES

MODEL	A	B	C	D	E	F	G		H		K		J		L		M	N	P
							LOAD	NO LD	LOAD	NO LD	LOAD	NO LD	LOAD	NO LD	LOAD	NO LD			
L	296	174¾	26¾	25½	51	41	13	16	163¾	166¼	124½	127½	11	13	25	27	25¼	25½	28½
2-L	328	192¾	26¾	25½	63½	41	13	16	164¼	167¼	123½	126½	11	13	24	26	23½	25½	26½

The double-service bus

Double in the sense that it provides a dependable service for the daily traveler and also attracts the patronage of the sightseer and pleasure rider in non-peak hours of the week days and on Saturdays, Sundays and holidays.

Here is a vehicle which enables the operator to capitalize on the healthful open air ride, an appeal that is beyond question. This type has seating capacities ranging from 51 to 64 passengers and the vehicle can be equipped with either a completely glass-enclosed upper deck or an all-weather top, opened up in fair weather, but which can be quickly adjusted to afford protection against sudden storms or cold.

Fifteen years of successful operation of double-deck buses in Fifth Avenue, New York City, have demonstrated that this type of carrier has come to stay and that it definitely has established its place in the field of transportation in this country. No experiments have to be conducted when you purchase Fifth Avenue Bus equipment. It is tried equipment. We have done the experimenting. All you have to do is operate, thereby reaping the harvest of our vast experience.

Send for our catalog "*A Fifth Avenue Transportation System for Any Community,*" which contains full specifications of all types of Fifth Avenue Buses.

NEW YORK TRANSPORTATION CO.
New York, N.Y.

AERA

Reaching out ——

"It is my thought that the electric railway is here for a great many years to come, but there are places where auxiliary service can be furnished by buses, and this should be done by the present railway operating company."

F. R. Coates,
Henry L. Doherty & Company,
New York, N. Y.

-for extension service!

WHAT about that growing district that lies way out beyond the terminal?

Real estate development is booming. Prospective passengers are populating the new section. How are you going to offer them transportation service without expensive extension of your track and overhead?

The bus is the answer. The Mack is the bus.

Mack bus service, as an extension to your line, collects these outlying fares and protects your investment. The beauty of Mack buses is, in itself, an invitation to ride. The dependability with which schedules are maintained quickly wins passenger confidence. The economies effected in daily operation and maintenance costs make the service profitable to you.

Mack bus passengers ride in luxurious bodies, that literally float on cushions of live resilient rubber which support the ends of the long, flexible springs.

The chassis is a specially designed low *bus chassis.* The body is only one step from the ground. From bumper to tail light, the Mack is *all bus,* designed and built to meet bus operating conditions and make permanent friends with the riding public.

Transportation has absorbed the bus just as it absorbed the electric car when it was introduced, years ago. Modernization includes buses as the answer to the present railway problem.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 Broadway, New York City
Builders of City and Sedan Type Busses

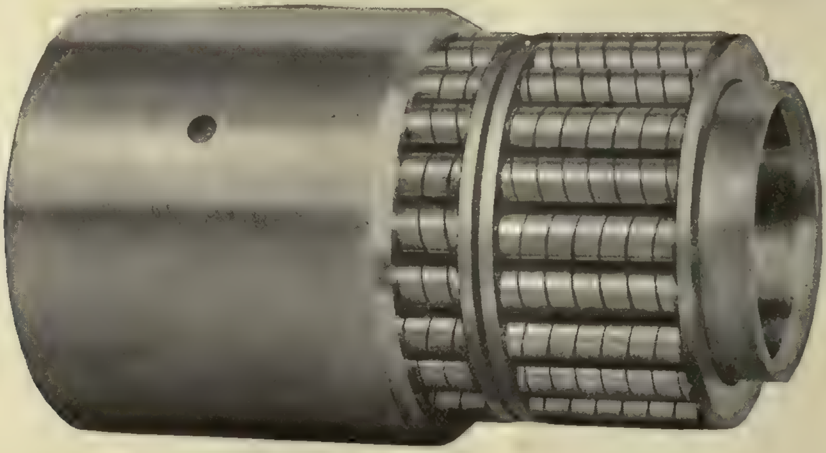
Eighty-three direct factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

The Mack Bus

25 Passenger, City Type

Sixty-seven per cent of Mack Bus deliveries this year have been to street railway companies.

Performance counts!



Hyatt Roller Bearings For Electric Railway Cars

THOSE officials who are responsible for the dependable and economical operation of electric railway cars should investigate the advantages of applying Hyatt roller bearings to car journals.

Our exhibit during the convention of the American Electric Railway Association at Atlantic City will show the latest developments in the application of Hyatt roller bearings to electric railway cars.

The successful use of Hyatt railway bearings is predicated on more than 30 years experience in the manufacture and application of these dependable, economical bearings to machinery of all kinds, plus close cooperation between prominent railway officials and Hyatt railway bearing engineers.

Our engineers are prepared to work with you in studying the application of Hyatt bearings to your rolling stock, without obligation.

HYATT ROLLER BEARING COMPANY
NEWARK, NEW JERSEY

The right stuff in the right spot

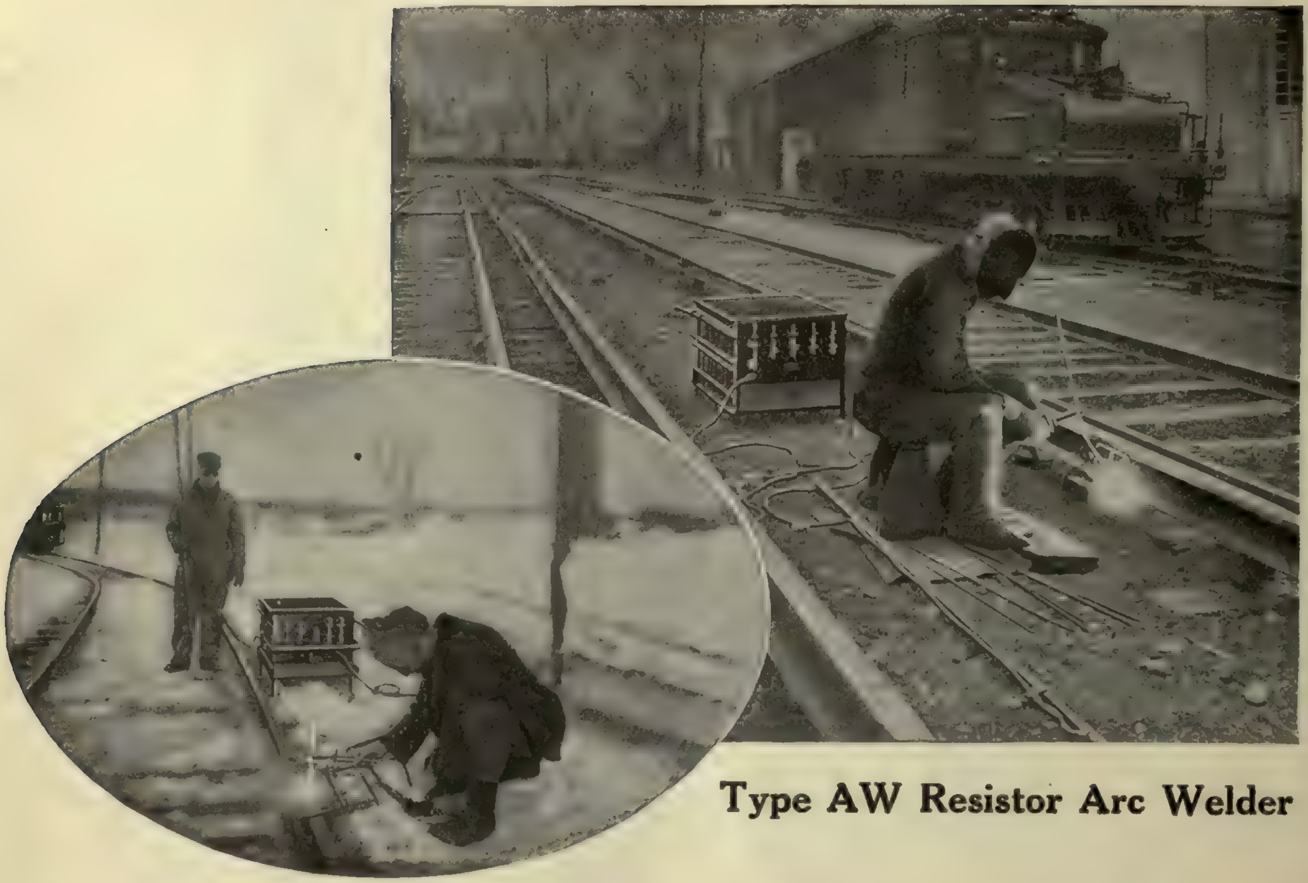
Just because this "veteran" maintenance man has been doing this for years, don't be too sure he's doing it the most efficient way.

Galena experts—going from road to road, constantly checking results, constantly comparing data, are posted on all the most efficient practices and the most economical methods.

Galena lubricants correctly applied, are cutting costs on many roads.

Galena lubricants are especially prepared for electric railway requirements. There's a Galena oil or grease or compound for every spot where friction occurs—bearings, gears and commutators on the cars, turbines, engines, generators and auxiliaries in the power plant. Even grease for the track curves is given special attention.

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities



Type AW Resistor Arc Welder

Type AW Arc Welder

- —weighs 140 lbs.
- —does good work in quick time at minimum cost
- —withstands wear of weather
- —specially designed for welding rail bonds, fish plates, etc.
- —operates on 400/650 volts, and welding current can be varied by 15 ampere steps to 60 to 200 amperes.

"It recommended itself on account of its lightness"

—writes a user of the AW Arc Welder. "It is the lightest machine for doing this type of work that we know of, and for the use to which we put it this lightness is a distinct advantage on account of the number of set-ups per day over a considerable stretch of track.

"It has been in service about a year and has performed its work very satisfactorily. We use it on maintenance work where the bonds to be applied are more or less scattered—and with two men put on 60 to 70 bonds per day."

Just hook the Type AW Arc Welder to a trolley wire and you get service that satisfies.

Light weight—easily handled

Ask the G-E sales office nearest you for complete information on your electric welding requirements.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

[illegible]

GENERAL ELECTRIC

New York, August 30, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and Harry L. Brown, *Editors*

Volume 64
Number 9

Modernization Features the Convention Program

MODERNIZATION, which has been the principal topic of discussion of the American Electric Railway Association throughout the present year, is given a prominent place in the program for the Atlantic City Convention, published in this week's issue. Such subjects as "Finance" and "Co-ordination," to which the first two sessions are devoted, are of great importance to all railway executives.

The outstanding feature of the American Association program, however, is the Friday morning session devoted to the topic of "Management." At this session will be presented the result of the extended investigations carried on by the committees on city operation and interurban operation, which have done much to disseminate information as to how modernization may be effected, and to instill in managements the need for and the good results of such modernization.

Then, too, there will be a report from the special committee on foreign operation, which is returning this week from abroad after a six weeks' study of practices which represent the best efforts of European operators. This report is looked forward to with great interest. The members of the committee are thoroughly familiar with the problem and undoubtedly will be able to give railway men many new thoughts that are applicable to American conditions.

The programs of the affiliated associations likewise show that the same care has been given to obtain features that will not only interest but will be of real value to those who attend the sessions.

The reports of the various committees, which take the major part of the time, deal with live subjects and in themselves indicate the progress being made in the industry. In addition, the individual papers cover a wide range of subjects that deal with the leading problems of the day.

Another innovation in the program is that Wednesday has been set aside entirely for the inspection of exhibits. It has long been felt that more time should be allotted for this purpose. This year, with far more space taken by exhibitors than ever before, and exhibits of new things not only by the old manufacturers but also by manufacturers new to the delegates, the need for this opportunity is even more apparent. How well it will work out depends largely on how conscientious the delegates are in their inspection. They can well afford to devote the entire day to the purpose.

With so much of interest to all classes of railway men, arrangements should be made by member companies and others so that as many individuals as possible can attend, and a wide range of departments can be represented. For while a verbal report from someone else who was there will give the stay-at-home some general idea of the convention, it is only by actual attendance that the full measure of enthusiasm can be obtained and the greatest impetus be given to the modernization program.

"There Are No Secrets About This Business"

A PROMINENT electric railway executive said recently that the time is past for discussing the need for utility publicity; that a railway executive who hadn't yet been sold on that idea, is a drag on the industry and deserves to lose his job. Inasmuch as everyone should agree with him, the need for publicity is not a subject for discussion.

But the way to make publicity copy effective is another matter. In the mind of the average man on the street, there is still present, in varying degree to be sure, the general impression that there is something mysterious about this railway business—that any company which carries thousands and frequently millions of people on its cars, must be making enormous profits in some way. In spite of former country-wide receiverships, and in spite of increasing prices in other commodities while street railway fares remained constant for several years, this idea still seems to cling in the minds of a great many people.

In a business so closely regulated as the electric railway industry prosperity means the ability to earn operating costs and a reasonable return on a limited investment. Should a surplus above this amount appear, steps would be taken at once to reduce fares, impose new service standards, or otherwise limit the possible return to the owners. "Profits" as such are virtually unknown in electric railway operation. The only kind of advertising copy which will overcome false impressions and present this true picture is the kind that publishes facts—facts about the business—operating and financial statistics and any other matters which will give the average man an insight into what might be considered the secrets of the business.

Now, to collect the facts is one thing, and is a big job. But to get the public to read them and to become interested in them is altogether a different matter. The facts must be made interesting, they must appeal to the imagination. The average man is primarily interested in the kind of service he is getting, and cares little how the result is accomplished. Nor is he interested in the problems with which the railway management contends. But the right kind of advertising will attract his attention. In Pittsburgh, for instance, the right kind of advertising awakened public interest to a point where it won the recent strike—and it was "facts advertising."

this relationship has formed the basis of the later franchises granted in the largest cities of this country, like New York, Chicago and Boston, where new lines are laid out according to a definite plan by a commission acting for the city. But this comparatively modern development applies to only a few cities except so far as the responsibility for such systematic development has been assumed by public service commissions. The tie between town planning and railway development in the future is bound to be much closer than in the past, and it is particularly interesting to note Mr. Delavenne's recommendation, as a municipal representative of the Paris plan of public ownership and private management, that this combination forms the best way of combining efficiency and true social progress.

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Now, to collect the facts is one thing, and is a big job. But to get the public to read them and to become interested in them is a still more difficult matter. The facts must be made interesting, they must appeal to the imagination. The average man is primarily interested in the kind of service he is getting, and cares little how the result is accomplished. Nor is he interested in the problems with which the railway management contends. But the right kind of advertising will attract his attention. In Pittsburgh, for instance, the right kind of advertising awakened public interest to a point where it won the recent strike—and it was "facts advertising."

"There are no secrets about this business" represents a thought that can be effectively applied in making utility "facts advertising" of interest to the public and of value to the railway.

Giving as Much Information as Possible on Route Signs

IN THE laudable efforts to merchandise transportation being made by many companies, it is natural that greater attention is being paid to the display of route signs on cars. The feature in which the regular passenger is particularly interested is that the route sign can be identified at a distance. The less frequent patron and the stranger want the sign to give detailed information about the route traversed. To supply this twofold want many cars display conspicuous route numbers or letters in addition to the usual lettered signs. Such route numbers fulfill well the requirements of the regular rider, and they are useful to the stranger because he can easily learn by inquiry the number of the route to take to reach any particular destination.

Experience shows that the value of the route number sign can be increased if a list is published giving the routes indicated by the various numbers or letters and showing also what lines reach points of interest or other common objectives.

The fact that a number or letter is used for a route sign does not exhaust the capabilities of this kind of sign. A variation possible is to designate by the sign in some special way all routes which reach or pass the destination of a great many passengers. Thus, in Denver, all routes passing City Park have route numbers ending in a zero, like 20, 30, 50, while all routes passing Union Station have route signs of white numbers on a red background. Still another variation is to indicate short route cars by a red band across the route numeral, as in Philadelphia and Paris.

In horse-car days, when there were several railway companies in every large city, each company painted its cars a distinctive color, so they could be recognized a long distance away. Where there is only one company in a city, its cars are apt to be painted alike, and the route signs become the only distinguishing mark. It should not be written of the present generation that when they sought of the railway company a sign, no sign was given them. A safe rule is that it is better to over-sign rather than under-sign a car. Although many railways exercise commendable care in this respect, a few continue to be negligent. It would be worth their while to give the subject of route signs more attention.

Every Dead Body Deserves a Decent Burial

ALONGSIDE of the main line of one of the most heavily traveled railroads in this country lies the junk yard of an electric traction company. Old cars, no longer able to perform useful service, are allowed to stand there and rot away. The paint is gone from the outside of the car bodies, the glass is gone from the windows, the platforms sag and the window posts sway back and forth in the wind. A more complete picture of dejection could not exist. Yet this is the sight which is presented every day to thousands and thousands of travelers on this busy section of the steam railroad. It is largely by this picture that they remember the electric railway in that city. To a certain extent it cannot fail to affect the impression they have of electric railways in general. There is no necessity for flaunting a cheerless spectacle like this before the public. When an old car has done its duty it should be retired from service, all useful material removed, and the remaining shell entirely destroyed.

Modern Inspection Facilities for the Interborough System

Second Article

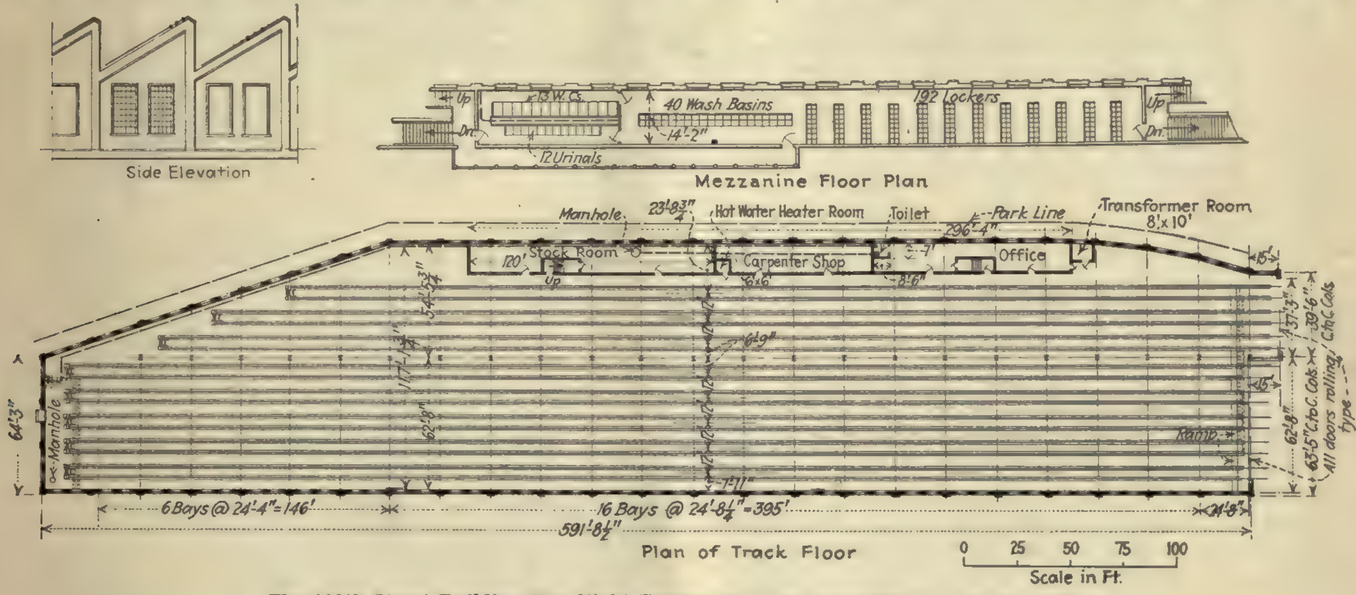
The City of New York Is Building Six Storage Yards and Inspection Buildings to Provide for 2,266 Cars of the Interborough Rapid Transit System—These Will Provide for the Full Capacity of Present Lines of the Subway Division—The Two Completed Are Described

TWO modern inspection buildings have recently been completed and placed in service by the subway division of the Interborough Rapid Transit Company, New York City. These buildings, which embody the latest practices for facilitating inspection of rapid transit cars, along with the adjoining storage yards, are part of a plan under which the city of New York, under the direction of the Transit Commission, is adding to the inspection and storage facilities of the Interborough. Altogether there are six projects of this sort, including the two which have just been finished. Under the contract between the company and the city, the latter is responsible for supplying to the company all necessary facilities of this kind.

The capacity of the new inspection facilities is intended to be adequate not only for the present rolling stock, but also for such increases as are anticipated within the early future. The locations of these inspection buildings are at the ends of the lines and adjoin the storage yards so as to reduce dead car mileage to a minimum. In all the work of design the engineers of the railway company naturally worked closely with those of the commission, so that the finished shops represent the ideas of both.

The work contracted for under the Transit Commission includes only the shell of the building, with whatever conduits, steam piping and plumbing are necessary as permanent features of the construction. The operating company supplies the conduits and wires for lighting and power; lighting fixtures, cranes, testing apparatus, storeroom bins and other similar equipment which is not considered a part of the actual building. The trackwork within the building, however, is classified along with that outside and it is installed by the city.

The locations of the six inspection buildings and yards were shown on a map published on page 238 of the issue of this paper for Aug. 16, 1924, of the six inspection sheds. The two which are completed are those at 180th Street, the Bronx Park terminus of the Lexington Avenue line, and at Livonia Avenue in Brooklyn, at the end of the Eastern Parkway line. There is a storage yard accompanying each of these shops. The other four projects are at the end of the Jerome Avenue line, 239th Street at the end of the White Plains Road line, Westchester at the end of the Pelham line, and Corona at the end of the Flushing extension of the Corona line in Queens. The total storage capacity for all six of these yards and buildings, including the space over the inspection pits, is 2,266 cars, divided as shown in the following table:



The 180th Street Building Has Eight Tracks Each Accommodating a Ten-Car Train

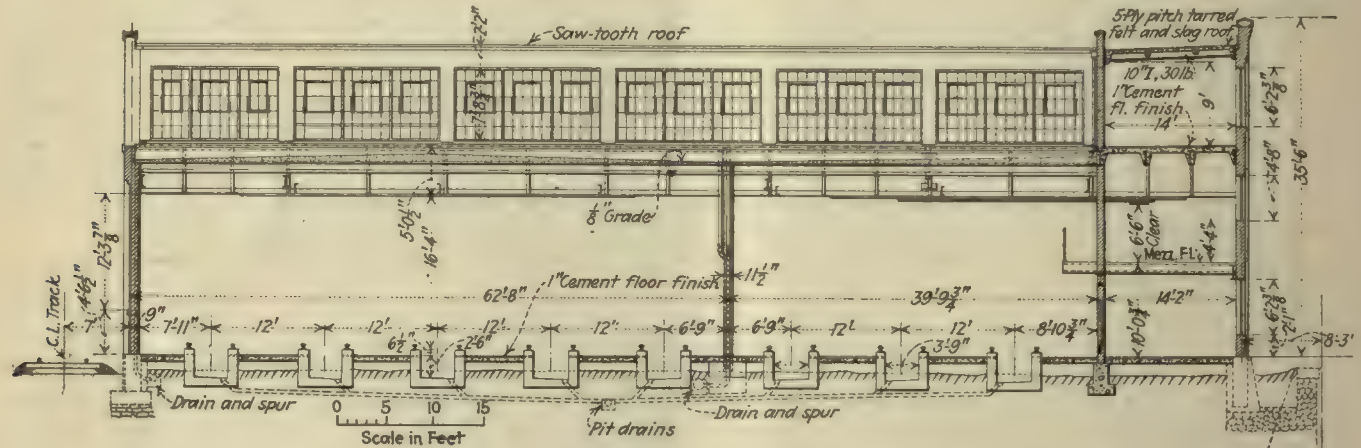
CAPACITY OF INSPECTION BUILDINGS AND YARDS, INTERBOROUGH RAPID TRANSIT COMPANY

Location	Total Storage Capacity, Cars		Probable Completion Date
	In Yard	In Inspection Pit	
180th Street	26[illegible]	80	Completed
Livonia Avenue	31[illegible]	40	Completed
Jerome Avenue	300	40	December, 1924
239th Street	546	80	December, 1925
Westchester	363	45	July 1926
Corona Avenue	165	40	December, 1926
	1,941	325	

The subway division of the Interborough at present comprises 222 miles of single track, and there are accommodations for storing approximately 2,000 cars in temporary sheds and on third track. On account of the operating demands the company has constantly been increasing the number of its cars, and this means that there should be corresponding increase in adequate storage space and inspection facilities. It is estimated that with 222 miles of track the maximum number of cars that can be operated is 3,000. Including the existing storage yard, the contemplated plans will only suffice to provide facilities until this number is reached.

THE PROJECT WILL COST $10,000,000

In the entire plan for shop and storage facilities for the Interborough Rapid Transit Railway approximately $10,000,000 is being spent, which averages a little more than $4,000 per car. This figure does not include the $5,000,000 required for the general overhaul and repair shops nearly completed at 148th Street on the Lenox Avenue branch of the Seventh Avenue line, and which were described in ELECTRIC RAILWAY JOURNAL May 3, 1924, page 688.



Typical Cross-Section Through Pits Showing the Pits Under Each Track and the Saw-Tooth Roof Construction

Each of the inspection projects has its individual characteristics, on account of the varying physical layout and the number of cars to be handled, but the cost of the 180th Street development, which amounted to approximately $2,540 per car, including those in the yard and over pits, is considered most representative. This entire project, costing some $965,000, may be subdivided as follows:

Real estate for the inspection buildings	$160,000
Building, including pit construction	415,000
Trackwork including that in yard and building	180,000
Real estate for storage yard	210,000
Total	$965,000

These figures do not include the cost of engineering, superintendence during construction, or interest on the investment during the construction period. The real estate was obtained by the city some years ago through condemnation proceedings, and when the value of property in the vicinity was somewhat lower than at present. The total construction cost is, therefore, somewhat less than the cost would be to duplicate the project today, although the building was only recently finished.

The conditions existing at the Livonia project, the other one which is completed, resulted in a considerably higher total cost, as follows:

Real estate	$160,000
Trackwork	225,000
Building, including foundation and special steelwork floor, with steel elevated structure for lead-in track	1,225,000
Total	$1,610,000

Including 310 cars in the yard and 40 over the pits, this cost averages $4,600 per car.

CONSTRUCTION OF THE 180TH STREET SHOP

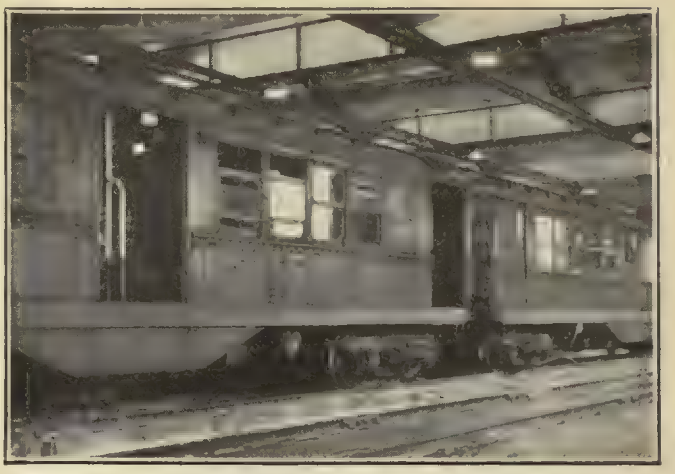
The inspection building at 180th Street is typical, both as to cost and general appearance, of those contemplated for the four other locations. The building is classed as semi-fireproof, being constructed without wood, but not having the steel work encased in concrete. The building is one story in height without a basement, and is 592 ft. long by 120 ft. wide. Inspection tracks with pits, extending the full length of the building, provide accommodations for 80 cars.

The foundation was placed on earth or piling where rock was not readily accessible. The walls are of concrete. About 50 per cent of the wall area, however, is taken up with windows having steel sash and wire glass. Due to the low roof, which has a clearance of only 4 ft. above the roofs of the cars, these windows are not depended on for lighting the entire floor area. The reinforced concrete roof has saw-teeth extending across the entire width of the building, although the steel trusses which support it do not run entirely across, but are supported at one end on a row of columns set up between two of the tracks. Pre-cast concrete slabs with wire mesh reinforcement cover the sloping sides of the roof, with a finish of roofing tile laid over roofing paper. The vertical faces of the saw-teeth are fitted with steel sash glazed with clear glass, the sections being arranged to swing open. Owing to the necessity of being economical of room because of the high value of real estate the clear spacing of the tracks is only 12 ft. between centers.

The stock room, carpenter shop, transformer room and office are located on the main floor along one wall of the building, while above these on the mezzanine floor are located the washroom, locker room and toilets, and a recreation room for the men has been provided on the second floor above the mezzanine, as these buildings are located in outlying districts of the city.

Each of the eight tracks in the building has a pit extending the entire length. These pits are 3 ft. deep below the base of the rail, and are 3 ft. 9 in. wide. The pit floors slope transversely for drainage. In each pit side wall are recesses for electric lamps and re-

A Portion of the 180th Street Inspection Building of the Interborough Rapid Transit Company, Showing Roof Construction



Interior of the 180th Street Building. The Tracks Are Raised About 1 Ft. Above the Floor to Facilitate the Inspection of Brakes and Journals

ceptacles for attaching extension cords. As the pits are not open on the sides, no attempt has been made to provide storage for parts and tools on the pit floor.

The floor and pits are constructed of reinforced concrete. The pit walls are flush with the floor and longitudinal stringers 6½ in. high are placed on top of them on which the track rails are laid. This makes a depression of the floor about 12 in. below the rail, but ramps are provided at each end of the building to bring the floor surface up level with the rail head. This arrangement was adopted to facilitate the work of the men who handle the lubrication of journals and side bearings.

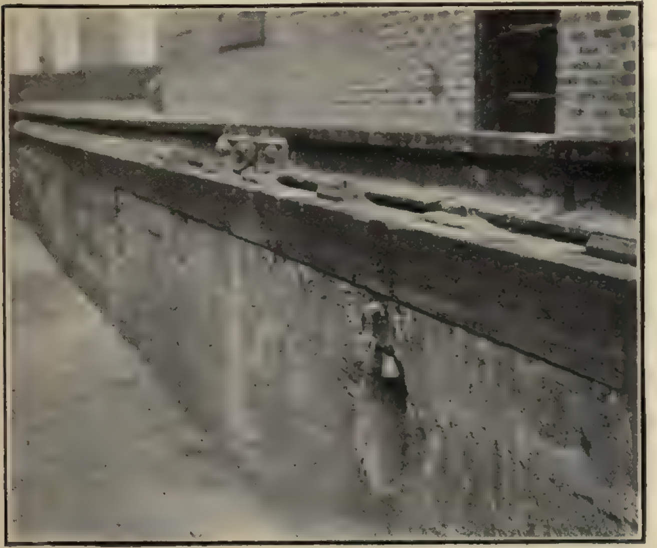
Entrance to the building is made at one end, eight tracks branching off from a ladder outside the structure. In the building at 180th Street a separate rolling steel door is provided for each track, 16 ft. high and 12 ft. wide.

Low-pressure steam for heating is supplied from a boiler located adjacent to the main building. In this room are coal storage facilities and a small repair shop for maintenance of the steam heating equipment. Radiators are placed along the side end walls of the main shop, and additional steam coils are suspended from the roof trusses. These provide a sufficiently high temperature so that the men may work in the shop during the winter time without requiring extra clothing.

General interior illumination is furnished by rows of fixtures placed approximately 25 ft. apart, with the fixtures in each row spaced 12 ft. apart so as to be directly over the aisles between tracks, thus making nine fixtures in each row. Every second row contains single fixtures, each holding a 200-watt, 125-volt lamp, supplied from the 125-volt a.c. service. The fixtures in the other rows each contain five 40-watt lamps, operated from the 600-volt d.c. railway power circuit. Each fixture has a dome type reflector to throw the light down to cover the floor with as little overlapping as possible. The alternating-current circuit may be supplied either from the Interborough's line or the New York Edison Company's service, both of which operate on 33,000 volts. With these three sources of light it is considered improbable that the building will at any time be in complete darkness.

LIVONIA INSPECTION BUILDING

A different construction was adopted at the Livonia inspection building, as the entire yard and structure were placed on a heavy fill. Although the yard tracks were very conveniently supported directly on the fill, it was considered inadvisable to place the building on such an unstable foundation as was offered by the filled ground. The building was, therefore, mounted on steel



One of the Pits at 180th Street, Showing Lamp Pocket and Track Construction

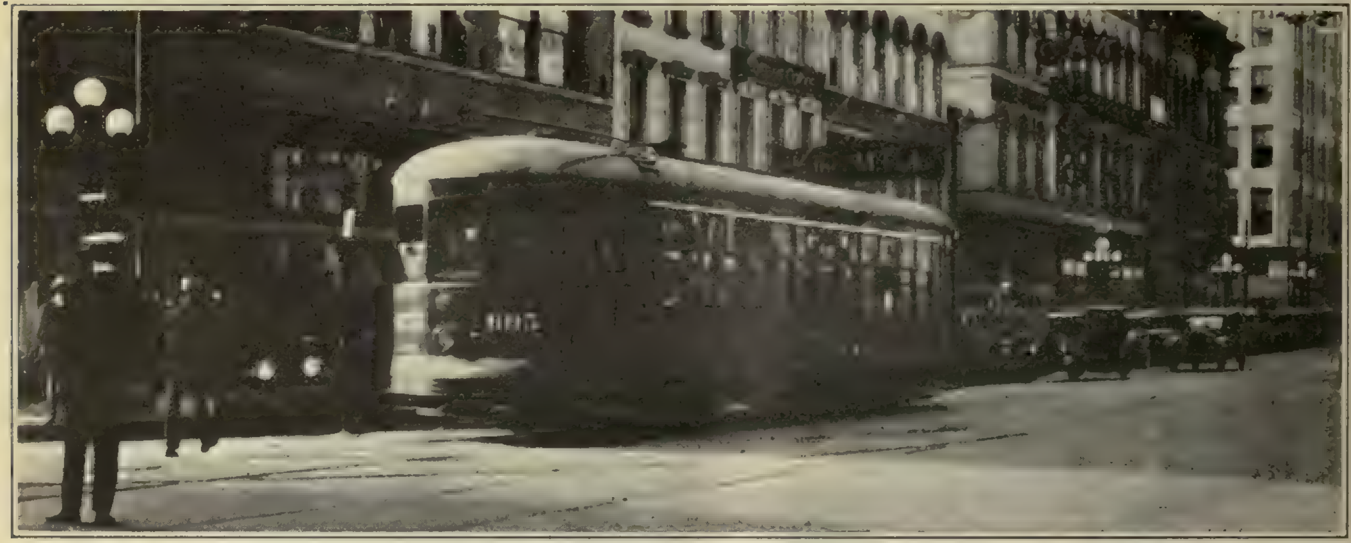
The Storeroom Has a Complete Stock, but by Carrying Small Quantities Its Size Is Reduced columns, with the main floor supported on steel girders to bring it level with the yard. In the space beneath are located the boiler room, coal bins and other storage space. The floor girders support the track rails, these in turn being supported by steel columns. The base is of reinforced concrete. The main inspection floor between the pits is of reinforced concrete, with the top 6½ in. below the base of the rail.

At Livonia Avenue the doors are hand operated and of the jack-knife type. They are hinged horizontally in two sections and when opened fold up against the roof.

Speeding Up Service in Memphis

Rerouting, Revision of Time-Tables, New Rolling Stock and Scientific Analysis of Operating Statistics Have Increased Speed 5 per Cent in Four Years

NEW cars and revised schedules have enabled the Memphis Street Railway, Memphis, Tenn., to make important improvements in the schedule speed of operation. This subject has been in the forefront of the minds of the company officials for many years, and unremitting efforts have been made in that direction. Since 1907, the average schedule speed of cars has been increased about 12½ per cent. Of this increase 5 per cent has been within the last four years.



Type of New Car Which Has Helped to Speed Up Service

A system of skip stops was installed in 1918, resulting in an increase of system average speed from 9.20 m.p.h. in 1917 to 9.56 m.p.h. in 1921. Since that time many of the stops which were removed have been restored, but there are enough still skipped to be an important factor in rapid operation.

Rerouting of cars in the center of city in 1920 took approximately half the cars which formerly operated on Main Street off that thoroughfare and put them on Third Street. This resulted in an increase of the schedule speed from 9.56 m.p.h. in 1919, as already mentioned, to 9.85 m.p.h. in 1921.

Schedules were revised and the amount of time spent in layovers was reduced, bringing the system average schedule speed up to 10.09 m.p.h. in 1922. The following year, however, a large amount of track construction was carried out and the speed fell off slightly.

SYSTEM AVERAGE SCHEDULE SPEED BY YEARS IN MEMPHIS, TENN.

Year	Miles per Hour	Year	Miles per Hour
1907	8.75	1916	9.41
1908	8.38	1917	9.20
1909	8.17	1918	9.26
1910	8.07	1919	9.56
1911	8.42	1920	9.53
1912	8.38	1921	9.85
1913	8.56	1922	10.09
1914	8.73	1923	9.99
1915	9.42		

In the early part of the present year the company placed in service forty new cars, of the type shown in the accompanying illustration. These replaced a larger number of the old single-track, hand-brake cars, and have made possible an increase in the schedule speed. For the first three months of 1924 the average was 10 m.p.h., while for the month of March it was 10.03 m.p.h.

A factor which has been helpful in maintaining a high speed of operation is the good co-operation which has been received from the local police force. On the other hand the railway operates forty-two trailer trains during the rush hours and all day on Saturdays and Mondays. These, as might be expected, have tended to slow down the operation.

As a check on the efficiency of operation, the transportation department keeps a daily record of the number of turnbacks on the entire system. These are plotted day by day on a chart, showing also the number for the corresponding days of the previous month. In December, 1923, the turnbacks averaged 47.8 per day. For January, 1924, the average was reduced to 30. In February it was 23 and in March only 12.3. The company considers that the number of turnbacks per day gives an accurate indication of the quality of service for that day. The reduction which has been effected in the average number from 47.8 in December to only 12 in March shows that the efforts of the transportation department to improve the service have been successful.

The Department of Street Railways, city of Detroit, Mich., reports 17 per cent less accidents during the first four months of this year than were experienced during the same period of 1923. Liability types of accidents, over which the company has most control, showed a decrease during this period of 30 per cent, and non-liability types, over which the department has least control, showed a decrease of but 11 per cent.

Portable Substation with Telescopic Tower

Suitable Spacing for 33,000-Volt Outdoor Apparatus and Overhead Clearance When Station Is Moving Over the Right-of-Way Are Obtained by the Telescoping Arrangement Employed on Interstate 300-Kw. Portable

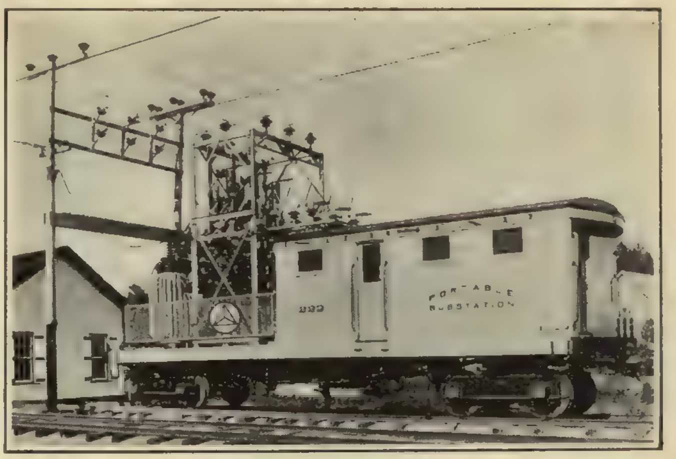
A NEW portable substation in service on the property of the Interstate Public Service Company includes a number of interesting design features which were worked out to provide sufficient spacing for 33,000-volt high-tension apparatus and at the same time allow the car to be moved about on the railway system with proper clearance under trolley wire, bridges and other permanent structures. The design employed has the advantage of holding the over-all length of the car to a minimum.

This substation and its equipment were developed by the engineers of the railway company, co-operating with the manufacturer of the switch tower and apparatus. The preliminary design was prepared under the direction of C. C. Argabrite, electrical engineer of the Interstate company, and J. M. Hedges. The engineers of the Delta-Star Electric Company of Chicago co-operated in this work and developed the structural details of the tower and other outdoor apparatus.

The station is of 300 kw. capacity with manual control. With the tower lowered for transporting the over-all height is 14 ft. 3 in. above the rail. When the tower is raised for operation the over-all height is 21 ft. The horn gap lightning arresters are carried on supports which are hinged from the tower structure so that in the operating position they extend over the roof of the converter room. These fold into the tower structure when the latter is lowered, so as to cut down the amount of overhead clearance required.

CONNECTIONS FACILITATE QUICK MOVEMENTS

The connections both to the high-tension lines and to the feeder are made in such a way as to facilitate the work of setting up or of moving the station. The transformer leads are connected by jack-knife connectors, and the feeder connection is made by bolted lugs. In bringing the feeder lead out of the body, specially designed supports are arranged on each side of the cab so that the cable can be connected to the overhead feeders on either side of the car. A special type of clamp is installed for making the negative connection to the rail, and turnbuckle rail clamps are provided for fastening and leveling the station.



Clearance for 33,000-Volt Outdoor Apparatus on the Interstate Portable Substation Is Obtained by Using a Telescoping Tower

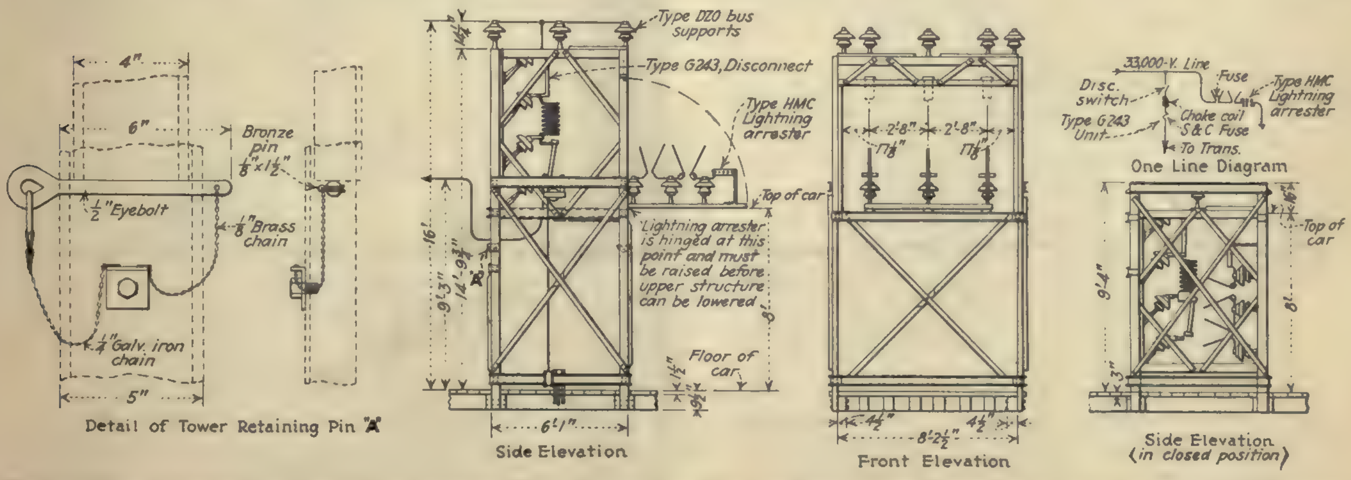
Overhead racks, with disconnecting switches, are located at various points on the system where side track facilities are available. Thus, the substation may be connected in at any of these locations without de-energizing the high-tension line.

Some of the more important dimensions and items of the equipment of the substation are as follows:

Length over coupler pulling faces	36 ft. 0 in.
Truck centers	23 ft. 8 in.
Extreme width over all	9 ft. 2¾ in.
Length of body over all	18 ft. 0 in.
Size of outside sills	4¼ in. 8 in.
Size of intermediate and center sills	4 in. 8 in.
Bolsters	Built up structural steel
Trucks	Buckeye freight car type
Journals	5 in. x 9 in.

The converter room is equipped with storage cabinets for carrying spare parts and miscellaneous supplies. These cabinets are built into the walls of the compartment. In addition a large storage cabinet is built underneath the body. The inclosed body of the car is covered with No. 16 gage sheet steel.

A duplicate lighting system is installed, so that the substation can be illuminated either from the transmission line or d.c. feeder system. When alternating current is used for the lights, current is taken from the low-tension side of the power transformer.



The Lightning Arresters Are Carried on Supports Which Extend Out Over the Roof of the Closed Body When the Car Is in Service and Fold Up When the Tower Is Lowered

With the Tower Down, Clearance Is Obtained so that This Portable Can Pass Under Bridges and Other Permanent Structures

A small car type air compressor is mounted under the body to provide compressed air for blowing out the apparatus and thus keeping it clean. Standard telephone jack plug connections are provided, so that operators of this car can make connection with the company's regular telephone system. In this way they can reach the load dispatcher at any time for any instructions which he may wish to give.

The general appearance of the complete unit is shown in the accompanying illustrations. Some of the features of the tower design are shown in detail in the accompanying line drawings. A set of worms and gears, operated by hand cranks, is used to raise the tower into position through the medium of flexible cables and pulleys mounted on the lower section of the tower. After the tower has been raised, steel pins are inserted to maintain it in position. The method of folding the lightning arrester supports when the tower is lowered is also shown in the drawing.

Transit Conditions in Greater Berlin

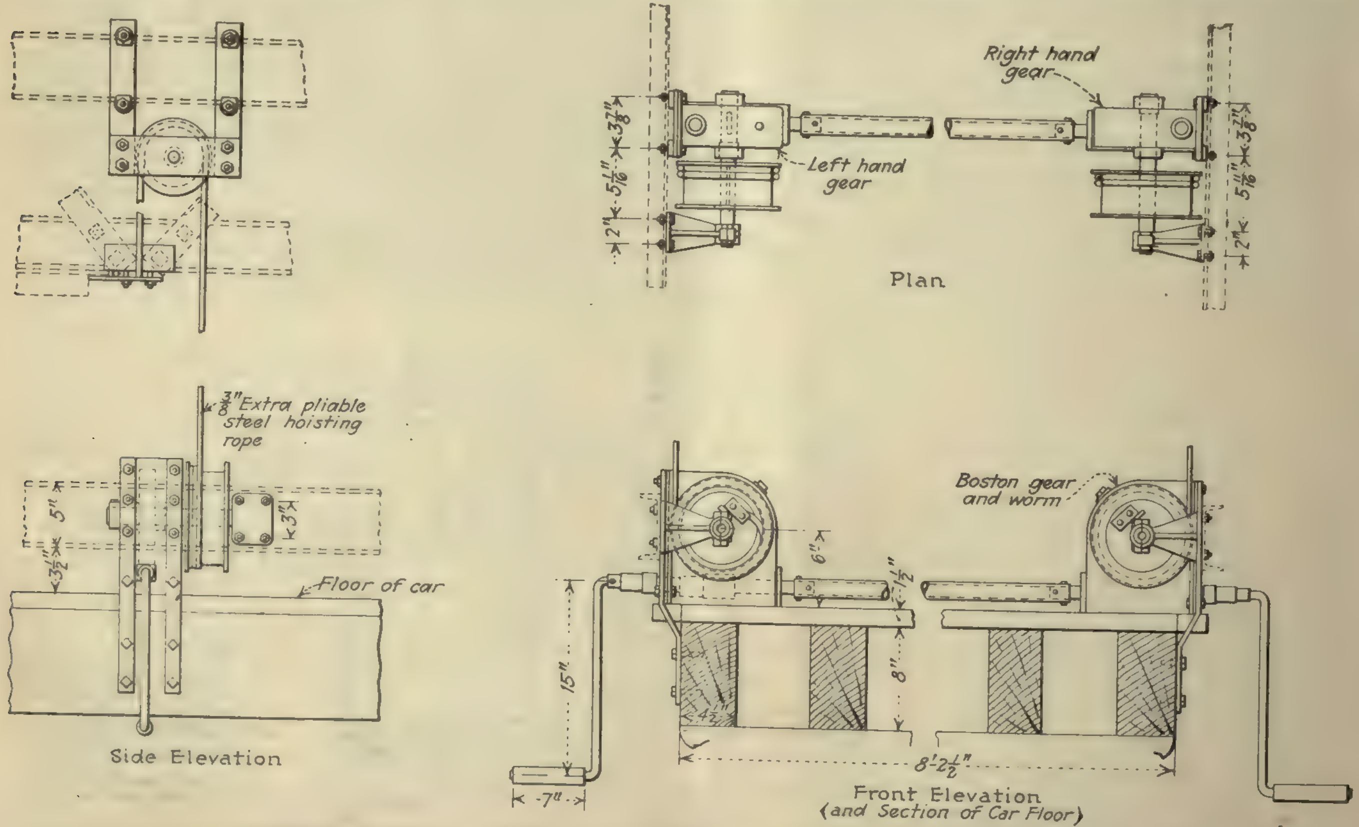
There Were Fewer Passengers on the Transportation Lines in Berlin in 1923 than in 1917 or 1913—Financial Conditions Prevent Further Development

By Dr. Ing Erwin Heisterbergk
Engineering Staff, German State Railways

BERLIN'S rapid increase in population during the few decades before the war and especially the growth in population of its suburbs made the need for rapid transit increasingly great. As in other large cities, with this increase in population and a still greater increase in railway traffic (see table) there came an increase in the length of ride and of the time required for the average trip. The surface line system became inadequate to care for this business, and the cars downtown actually showed a decrease in speed. During the evening rush hour actual timing showed that from 10 to 12 minutes was taken by these cars to go 1 mile within the congested area.

Berlin's rapid transit system began in 1902 with the construction of the Elevated & Underground Railway from Warschaüer Bridge to Charlottenburg (see Map I). The system developed so rapidly that in 1913 there were 22 miles of route in operation and 12 miles under construction. During the war building stopped and only one line, a north and south line from Seestrasse to Gneisenaustrasse, has since been finished. It was opened in 1923.

Map I shows not only the present rapid transit lines of Greater Berlin, but also the most important Stadtbahn and the suburban steam railway lines (to be electrified as soon as possible). On these lines last year



The Tower Is Raised by Worms and Gears Through a System of Flexible Steel Cables

57 per cent of all passengers in Greater Berlin were carried, as shown in the table. The rapid transit lines are operated by a private corporation, though some of them were built by towns now forming part of Greater Berlin.

CREATION OF GREATER BERLIN

Progress in the solution of the rapid transit problem in Berlin was delayed many years because there was no authority whose powers extended beyond the city boundaries. The logical step was to incorporate the whole of metropolitan Berlin in one municipality, but the former Prussian government did not wish too large an increase in the power of Berlin, whose political tendency was not that of the royal government. Therefore, the government passed the Zweckverband act in 1911 authorizing a joint board made up of representatives of Berlin and the surrounding districts to study rapid transit, city planning, and other related problems but with limited powers of administration. This action was taken over the protest of the Mayor of Berlin, who did not believe the act went far enough.

The revolution of 1918 removed the obstacles against the consolidation of Old Berlin with the surrounding districts, and in 1920 an act was passed consolidating Berlin, Charlottenburg and other neighboring districts into a Greater Berlin which is one of the largest cities in the world. This accounts in large part for the increase in population shown in the table between 1917 and 1923. If future increases are in the same proportion as before the war, the population of Greater Berlin in 1950 will be about six millions of people.

Map III shows the city boundaries of old and Greater Berlin. While old Berlin covered an area of 25 square miles, the area of Greater Berlin is 339 square miles, or about as much as Greater New York territory, excluding water. Greater Berlin's area is approximately circular, with its principal dimension extending east and west for about 28.7 miles. North and south the distance is 23.5 miles.

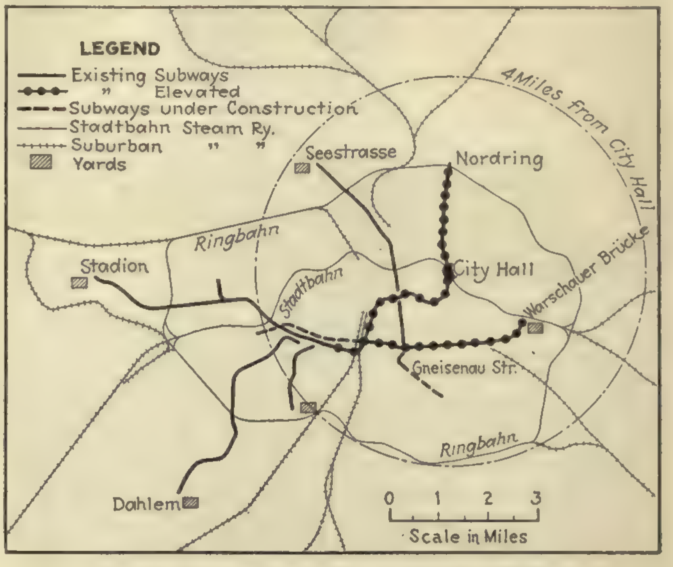
While the population has quadrupled in about fifty years, the traffic has increased 130 times, or from about 10,400,000 in 1870 to 234,000,000 in 1890 and 1,240,500,000 in 1923. However, there has been a decrease since 1913. This has been most noticeable on the autobus and surface lines, the reason being that their rates of fare were too high for an impoverished people. On the other hand, the government-owned Stadtbahn and suburban lines, through their low fares, doubled their traffic between 1917 and 1923, though this was done at the cost of all of the taxpayers.

PROPOSED RAPID TRANSIT LINES

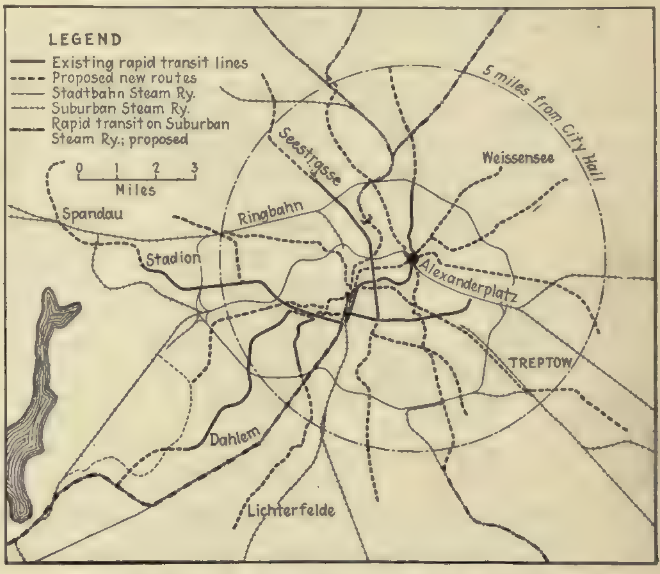
A most valuable service of the Metropolitan Board of Traffic and Town Planning in its period of existence from 1912 to 1920 was to recommend a comprehensive rapid transit plan as is shown in Maps II and III. On these maps existing rapid transit roads are represented by solid lines and proposed additions and extensions by broken lines.

All transit lines proposed are through-routed, that is, they traverse the center of the city, and they are so routed that they can interchange traffic. Excluding the Stadtbahn and suburban lines, the proposed system will have about 110 route-miles. Of this amount 63 miles will be subways, 25 miles elevated, 14 miles open cuts and 5 miles inclines. At pre-war prices it is estimated that the new lines and extensions would cost about $114,000,000 excluding power stations, yards and equipment.

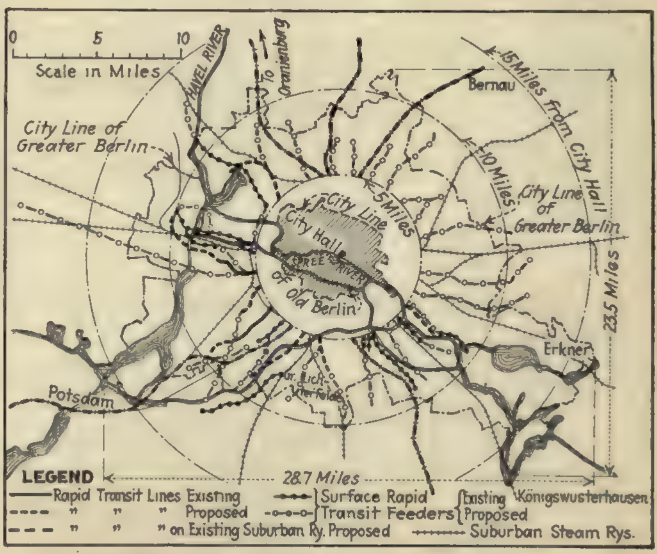
On the theory that every citizen within the center 5-mile zone should not live more than ½ mile away from



Map I—Present Rapid Transit Lines in Berlin



Map II—Proposed Comprehensive Rapid Transit Plan for Greater Berlin



Map III—City Boundaries of Old and New Berlin

TABLE SHOWING POPULATION AND PASSENGERS CARRIED IN THE PRESENT AREA OF GREATER BERLIN

Year	Population	Passengers Carried on Stadtbahn Steam Railways	Suburban Steam Railways	Rapid Transit Lines	Surface Lines	Motor Bus and Horse Bus Line	Total Passengers Carried	Rides per Capita
1890	1,929,000	40,000,000	23,400,000	....	143,000,000	27,800,000	234,200,000	121
1895	2,216,000	89,000,000	46,600,000	....	167,300,000	37,400,000	340,300,000	153
1900	2,660,000	115,000,000	69,600,000	....	280,600,000	80,600,000	545,800,000	205
1905	3,138,000	149,000,000	111,100,000	34,600,000	428,200,000	111,500,000	834,400,000	266
1910	3,621,000	190,000,000	163,000,000	56,900,000	568,900,000	146,000,000	1,124,800,000	311
1913	3,944,000	196,000,000	199,300,000	73,100,000	651,600,000	169,700,000	1,289,700,000	327
1917	3,390,000	163,000,000	148,000,000	111,500,000	96,500,000	33,200,000	1,352,200,000	399
1923	4,012,000	292,000,000	356,000,000	145,000,000	419,900,000	27,600,000	1,240,540,500	301

a rapid transit line, this 5-mile zone of Greater Berlin would require 140 route-miles. The proposed plan (including the electrified Stadtbahn and suburban lines) provides for about 125 route-miles. In the zone between the 5 and 10-mile circles, a distance of 1½ miles between two routes is supposed to be sufficient. Theoretically this would require 118 route-miles of rapid transit or feeder lines. The proposed system provides for about 140 route-miles. Unfortunately it is not expected that the rapid transit facilities of Greater Berlin will develop rapidly during the next few years, because of adverse financial conditions. Moreover the city does not yet have the power to assess the cost of construction of rapid transit lines against the owners of the benefited property.

Brisbane System to Be Rehabilitated

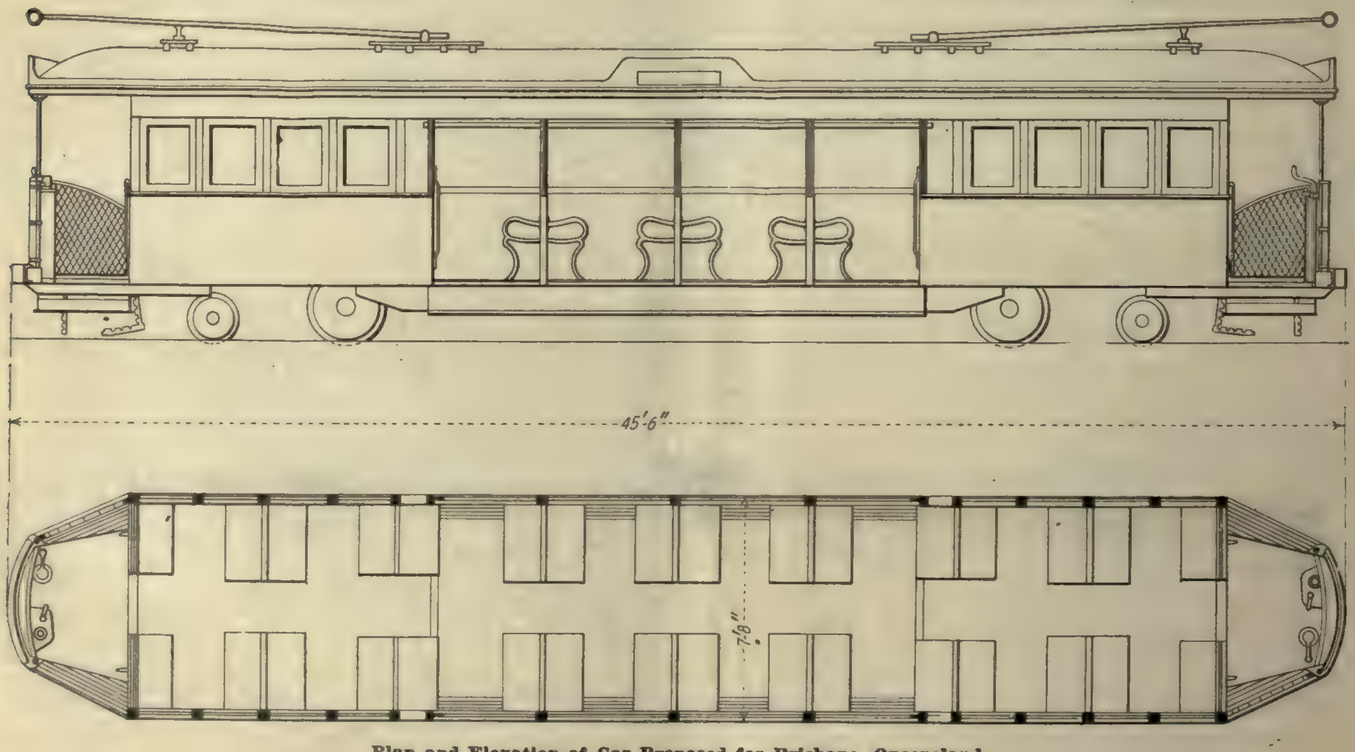
THE Privy Council in London has decided that the state of Queensland is to pay the Brisbane Tramways £1,500,000 for its property which has been taken over by the government, and is now being administered by a board. This board consists of two members appointed by the government and six representing various councils. The tramways property was formally taken over on Jan. 1, 1923, but the compensation to be paid for it has only recently been determined. The case first came up before the Full Court of Queensland, which on March 28, 1923, directed that the compensation should be paid on the basis of the physical valuation as of Jan. 1, 1923, with allowances to the company to cover the unexpired statutory rights in the case of certain extensions, also that the Land Court of Queensland should be the tribunal to fix the amount. Against this judgment the company appealed to the Privy Council with the result mentioned. The company asked for £1,738,257.

The tramway system in Brisbane consists of 70.54 miles of track and 182 cars. During 1923 the car mileage was 5,211,971; the number of passengers carried was 74,721,594, and the revenue received was £636,258. There are 1,386 employees.

While the definite plan for rehabilitation naturally has had to be delayed until there was a decision as to the amount to be paid for the property, the new owners have practically decided to rebuild the office building, carhouses and repair shops, and add considerable new equipment. The replacement of fifty old cars will be the first step.

The design of car shown in the accompanying elevation and plan is the one being considered. As will be seen, it is a combination open and closed car, with the closed compartments at the ends. The seats follow the back to back plan which has proved to be so popular in Australia.

This car will have a total of 64 seats or a greater seating capacity than any of the present cars, six exits on each side instead of two as at present, better protection against the weather, steps which will be 8 in. lower than on the existing cars, and the conductor will have free access to all passengers through the center aisle without using the running board.



Plan and Elevation of Car Proposed for Brisbane, Queensland

Light-Weight Cars for Racine and Kenosha

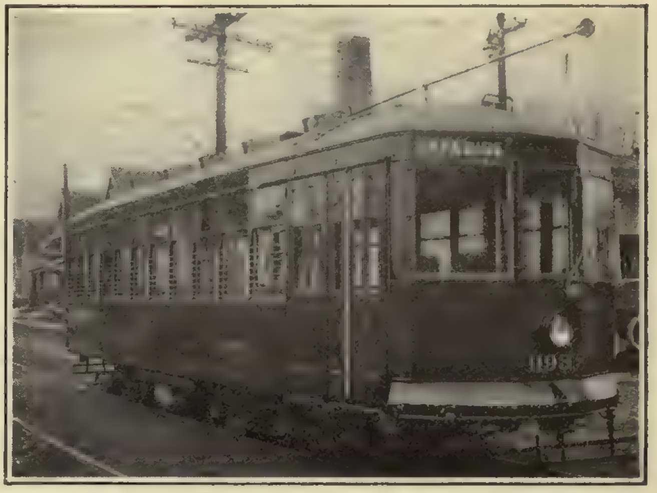
This New One-Man Equipment of the Milwaukee Electric Railway & Light Company Is Designed to Meet the Needs of Smaller Cities and at the Same Time Give the Desirable Riding Qualities of Double Trucks

TEN new double-truck one-man cars recently put in service in the cities of Racine and Kenosha, Wis., by the Milwaukee Electric Railway & Light Company, which operates the railway properties in these two communities, represent an interesting type of small double-truck unit for use in this type of service. The improved riding quality of the double-truck design was felt to offer a material advantage over the single-truck cars which had been operated in these cities for some time. These new cars, however, were made as short as was consistent with obtaining the necessary room under the floor for mounting electrical and air-brake equipment.

In their general structural design the new cars, which were built by the St. Louis Car Company, follow closely the construction used in the one-man, two-man cars put into service in Milwaukee in 1920 and 1921 and described in ELECTRIC RAILWAY JOURNAL Nov. 21, 1921. They are arranged for double-end operation, are of the arch-roof type and have platform floors carried level with the body floor except for slight ramps from the bolsters to the door openings.

DOUBLE DOORS AT FRONT END PROVIDE SEPARATE ENTRANCE AND EXIT

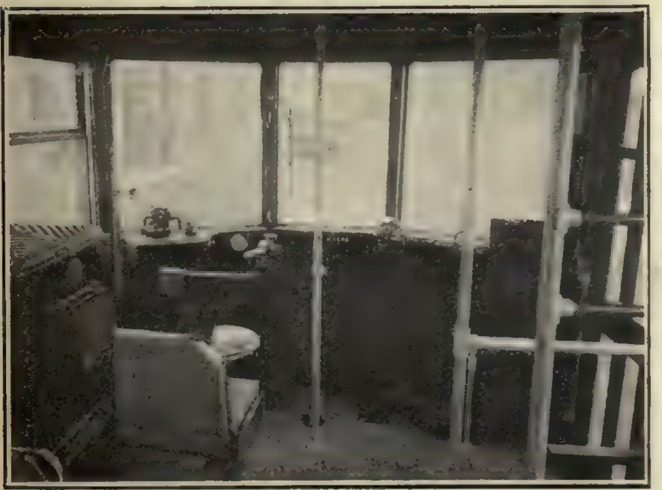
Separate doorways at the front end in each direction of operation allow simultaneous interchange of boarding and alighting passengers. Full Safety Car Devices Company equipment is installed and separate folding steps are connected with each door. The letterboard and side sill are carried across to the end framing, above and below the door openings, and there is no horizontal offset at the body corner post. Consequently, in order to keep the overhang of the doors at a minimum when they are folded open the panels are made as narrow as practicable. This is accomplished by dividing the exit door into two panels and the entrance door into three. The accompanying illustrations show the arrangement.

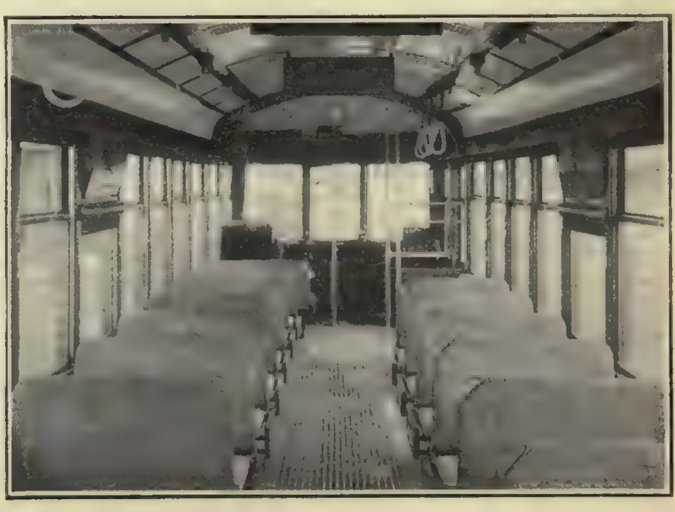

These Double-Truck One-Man Cars Are Popular in Racine and Kenosha Due to Improved Riding Qualities and Wide Entrance and Exit

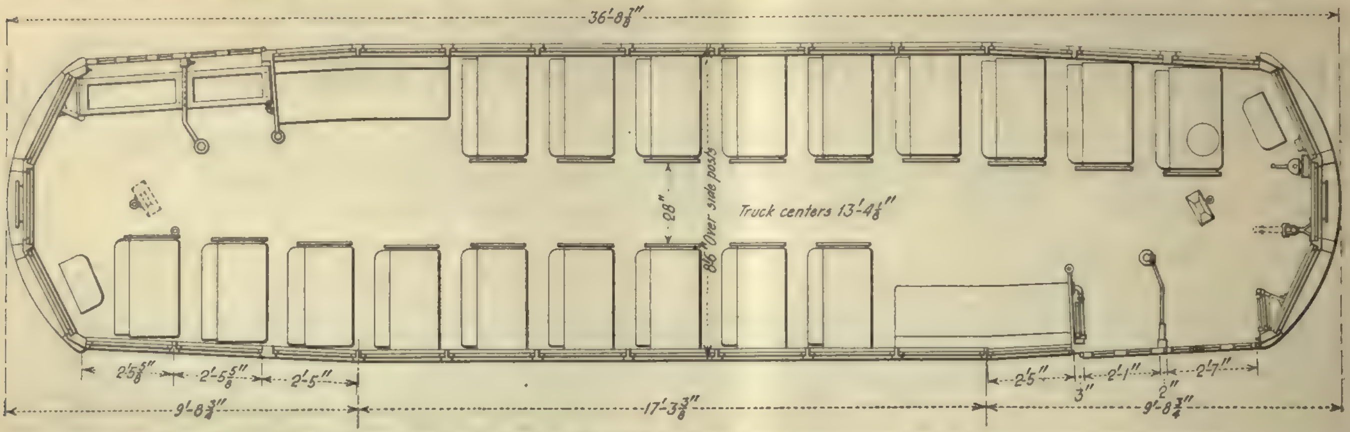
Seating capacity for 44 passengers is obtained with a total over-all length of 36 ft. 8⅜ in. Cross-seats are used throughout with the exception of one longitudinal seat at each of the corners, adjacent to the door openings. Folding seats provide accommodations for 4 seated passengers in front of the doors when they are not in use at the rear end.

WIDE AISLE TO FACILITATE MOVEMENT IN CAR

Since all passenger interchange takes place at the front end of the car, the maximum practicable aisle width was considered desirable for facilitating the passenger movement. For this reason the inside body lining below the arm rest is set in close to the side girder plate, with only enough space between to assure proper insulation in cold weather. The wall plate ends of the cross-seats are thereby carried inside of the arm rest line, so as to give hip room below the arm rest for a passenger sitting next to the window. With an over-all width of 8 ft. 7⅝ in. over the drip rails, 8 ft.


The Vestibule Windows Are Protected by Storm Sash in Winter. The Center Sash Is Equipped with a Window Wiper.


Liberal Aisle Space Is Provided to Facilitate the Movement of Passengers Within the Car



The Over-All Length of the Car Is 36 Ft. 8⅞ In. and Seating Accommodations for 44 Passengers Are Provided

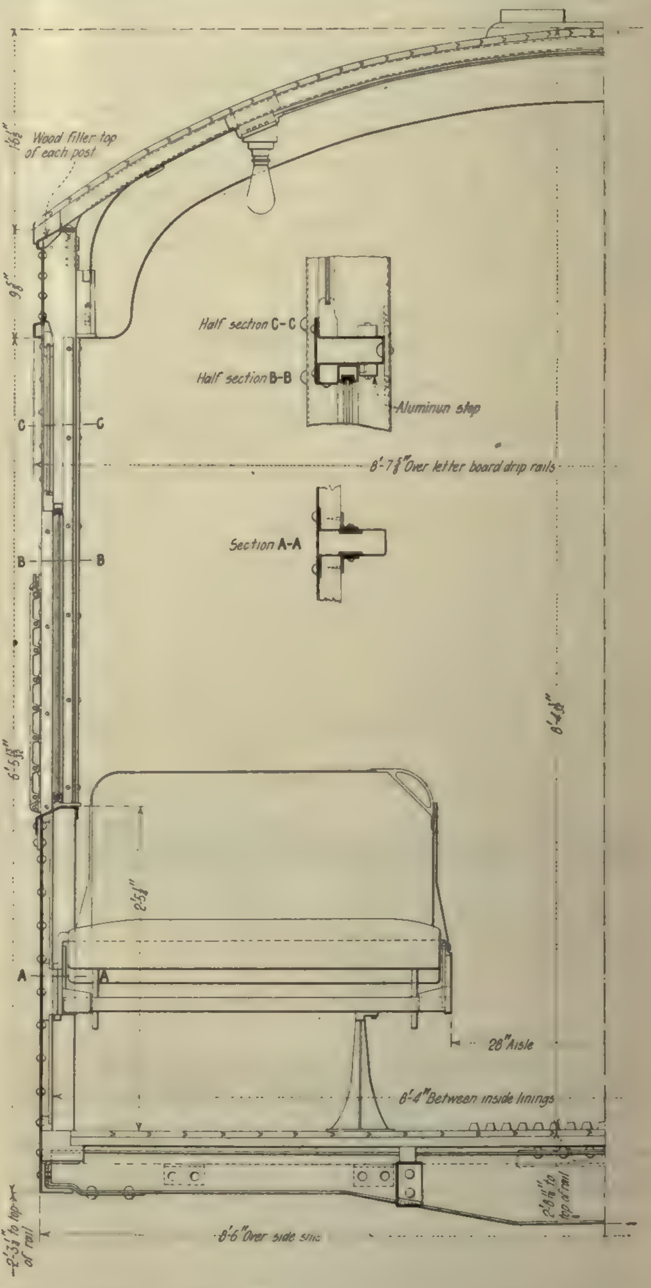
6 in. over the side posts and an inside width of 8 ft. 4 in. between body lining, an aisle width of 28 in. is obtained. The cross-seats are 36 in. wide over all.

Pressed steel side posts, which have been used extensively in Milwaukee on previous groups of cars, form the main vertical members in the body side structure. As shown in the accompanying cross-section, the posts consist of a flanged U-shaped member, installed with the open end of the U toward the exterior, and covered outside with a plate riveted to the flanges and extending between the letterboard and the belt rail so as to form an inclosed box column. The sheet steel letterboard and the side girder plate are also riveted to the side post flanges.

At the upper end of the posts flanges are provided to form a support for the bar steel carlines that are set on edge at each side post. The steel letterboard extends across the top of the side posts and is riveted between the carlines and the side post flanges. A light

SPECIFICATIONS OF DOUBLE-TRUCK ONE-MAN CARS FOR RACINE AND KENOSHA

Number of cars ordered	10
Date order was placed	June, 1923
Date of delivery	February, 1924
Builder of car body	St. Louis Car Company
Type of car	Semi-convertible, passenger
Seating capacity	44
Weight:	
Car body	16,420 lb.
Trucks	9,080 lb.
Equipment	4,000 lb.
Total	29,500 lb.
Bolster centers, length	13 ft. 4⅛ in.
Length over all	36 ft. 8⅞ in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 7⅝ in.
Height, rail to trolley base	11 ft. 2⅝ in.
Body	Semi-steel
Interior trim	Cherry
Headlining	Haskelite
Roof	Arch
Air brakes	Safety
Axles	Heat-treated carbon steel
Bumpers	Rolled channel
Car signal system	Consolidated
Car trimmings	Bronze
Center and side bearings	T. M. E. R. & L., lubricated
Control	Westinghouse K-6
Curtain fixtures	National Lock Washer
Curtain material	Pantasote, double-faced
Destination signs	St. Louis
Door operating mechanism	T. M. E. R. & L., air-operated
Fare boxes	T. M. E. R. & L.
Wheelguards	T. M. E. R. & L.
Gears and pinions	G. E. grade M
Hand brakes	St. Louis, drop brake handle
Heater equipment	T. M. E. R. & L., hot air
Headlights	Ohio Brass
Journal boxes	Symington
Lightning arresters	Westinghouse MP
Motors	Two G. E. 247, inside hung
Finish	Varnish
Sanders	Safety, air-operated
Sash fixtures	Edwards
Seats	St. Louis, rattan
Slack adjuster	Anderson
Springs	Fort Pitt
Step treads	Kass
Trolley catchers	Ideal
Trolley base	U. S. No. 13-E
Trolley wheels	6 in.
Trucks	T. M. E. R. & L. arch bar
Ventilators	Peerless
Wheels	Steel, 26 in.



Standard Milwaukee Side Framing Construction Is Used with the Upper Sash Set Between the Side Posts and the Lower Metal Sash Arranged to Raise wood top plate serves as a screwing strip for the tongue and groove poplar roofing and also for the roof molding.

Metal lower side sash, arranged to raise, are used in the body. The upper sash, however, are of wood, set individually between the side posts for each window opening. The parting strips installed between the lower side sash and the curtain groove are made of aluminum.

VESTIBULE WINDOW WIPERS ARE AN INNOVATION

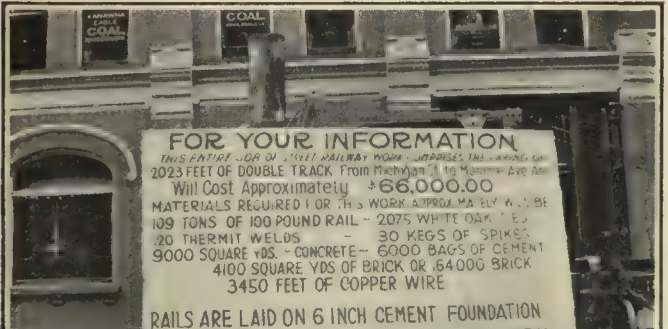
The vestibule sash are also of metal, arranged to drop into pockets in the dash. In winter the vestibule windows are protected by metal storm sash set on the outside of the posts and held by clips. A novel type of window wiper, designed and built in the Cold Spring shops of the company, is installed in the center vestibule window opening, as shown in the two views of the front of the car. The operating handle of this wiper extends through one of the vestibule posts and is arranged so as to be used by the motorman with storm sash in place.

Double thickness flooring insures warmth in cold weather. This is covered with the customary type of floor strips in the aisle.

Some years ago the Milwaukee company designed and built a light-weight type of truck which has since been standard on the property and is used under the new cars. The trucks are spaced on 13-ft. 4⅛-in. centers. With 26-in. diameter wheels, the floor height at the bolsters is 2 ft. $8\frac{11}{16}$ in. above the rail. No end sill step is used, but a total of $3\frac{11}{16}$ in. of ramp between the bolster and the end sill and between the center of the car and the door opening reduces the height of the floor at the door to 29 in. above the rail, permitting step heights of 14 in. and 15 in. respectively from street to platform.

Telling the Public What Track Costs

WHEN the Grand Rapids Railway, Grand Rapids, Mich., recently relaid track in the downtown section of the city, it made use of several advertising signs to inform the public what was going on. The signs were large enough to be read easily at a distance and told the quantity of rail, ties, cement, brick, etc., required for the work, as well as its total cost.



FOR YOUR INFORMATION
THIS ENTIRE JOB OF STREET RAILWAY WORK COMPRISES THE LAYING OF
2023 FEET OF DOUBLE TRACK From Michigan St to Monroe Ave
Will Cost Approximately $66,000.00
MATERIALS REQUIRED FOR THIS WORK APPROXIMATELY WILL BE
109 TONS OF 100 POUND RAIL – 2075 WHITE OAK TIES
120 THERMIT WELDS – 30 KEGS OF SPIKES
9000 SQUARE YDS. – CONCRETE – 6000 BAGS OF CEMENT
4100 SQUARE YDS OF BRICK OR 164000 BRICK
3450 FEET OF COPPER WIRE

RAILS ARE LAID ON 6 INCH CEMENT FOUNDATION
$25,000 OF THE TOTAL COST OF THIS WORK
WILL BE SPENT FOR LABOR
FOR THE SAFETY AND CONVENIENCE OF THE CITIZENS GRAND RAPID
WE WILL COMPLETE THIS WORK AS SOON AS POSSIBLE
IT IS EXPECTED THAT THE WORK WILL BE FINISHED [illegible] JULY 15 WEATHER PERMITTING
GRAND RAPIDS RAILWAY COMPANY

Example of the Advertising Used by the Grand Rapids Railway

Automatic Rear Exit Door Tried in Washington

IN ORDER to facilitate passenger movement in one-man cars, the Washington Railway & Electric Company, Washington, D. C., has equipped its cars of this type with automatically controlled rear exit doors and steps. The idea originated with J. H. Stephens, superintendent of railways, and work was done in the company's shop under the direction of R. D. Voshall, superintendent of equipment and structures. National Pneumatic devices are used in much the same way as on the cars of the Chicago Surface Lines, described in ELECTRIC RAILWAY JOURNAL for Sept. 30, 1922, except that the apparatus is used for the rear door in Washington instead of for the front door as in Chicago.

Passenger Alighting from the Automatically Controlled Rear Exit Door on the One-Man Cars of the Washington Railway & Electric Company

To enable the motorman to see when passengers wished to get off by the rear door, a large mirror 15 in. square has been mounted at each end of the car. A smaller mirror has been mounted outside of the front door so that the operator can see when the last passenger has alighted from the rear step. Moreover, the rear door is connected with a signal light in front of the motorman, which tells him as long as it is burning that the rear door is open.

Since the first of these cars was put in operation, the latter part of June, the apparatus has functioned perfectly without breakdown, jam or other mishap. There has been no accident or confusion occasioned by its use. The passengers appear to like the idea, and the company believes that the only legitimate complaints against the use of one-man cars have been eliminated by this means.

Dual Accident-Prevention Plan

Monthly Bonus Awards and "Distinguished Service Buttons" for the Trainmen Have Resulted in More Careful Operation and Fewer Accidents

ON THE railway lines of the Birmingham Electric Company, Birmingham, Ala., a dual plan for the prevention of accidents is in vogue. This scheme has produced excellent results in securing reports of all accidents and at the same time has relieved operating officials of the difficult task of differentiating between avoidable and unavoidable accidents.

Some time ago it was decided to use a bonus distribution as a means to secure a reduction in the number of accidents. The actual expenditure of the claim department for personal injuries and property damage during the past 3 years was taken as a basis of calculation. Each month was averaged separately. The bonus paid is the difference between the figure for the current month of the current year and the average for that month during the previous 3 years. This sum is divided equally between the company and the trainmen and shopmen without regard to individual records.

The fact that the individual trainman or shopman is not deprived of his share of the bonus because he may have had an accident during the month has not been found conducive to carelessness. On the contrary, there is a disposition on the part of the more careful men to observe the performance of the less careful ones, and to admonish and remonstrate with them when it is seen that they are becoming negligent. Moreover, the fact that the individual man is not penalized for an accident has had a tendency to insure a report being made of every incident that might result in a claim. To encourage the reporting of all accidents, an allowance is made of 45 minutes time for each report. The fact that the award of the bonus is dependent upon the actual expenditures of the claim department has made the trainmen diligent to aid the work of that department by furnishing full information.

In case the claims expenditure for a particular month is more than the average figure the balance is carried forward and subtracted the following month. No bonus is paid until the deficit has been made up. For the first five months of 1924 slightly more than $3,000 was distributed in bonuses.

In order that there might be greater incentive for the individual men to do as well as possible, the superintendent of transportation originated a plan of awarding so-called "distinguished service buttons." These are issued when no charge has been made against a trainman's record or expenditure of money by the claim department on an accident in which he was involved. No attempt is made to place the responsibility for the accident, it being assumed that if the claim department expended money there was some liability. General observation of rules is taken into consideration in connection with a conductor's record. Because it was thought that a short period would stimulate more interest than if the period were made a year, the record is made up every six months.

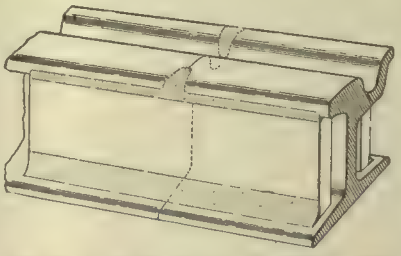
The buttons are about the size of a 10-cent piece and have the letters B. E. Co. in the center in black enamel. Around the outside appear the words "Distinguished Service, Transportation Department." Bronze buttons are awarded for 6 months without an accident, silver buttons for 1 year and gold buttons for 2 years. In case a trainman is in the 18-month or 2½-year class a stripe appears at the bottom of the button with the words "One and a Half" or "Two and a Half."

The plan was started on Jan. 1, 1923, and 34 men were awarded buttons for the year 1922. For the first 6 months of 1923 the awards constituted 135 bronze and 19 silver buttons. For the last half of 1923 there were awarded 14 gold buttons, 81 silver and 184 bronze buttons. At the end of the first 6 months of 1924 12 gold, 152 silver and 140 bronze buttons were awarded, making a total of 304. Inasmuch as the total number of trainmen averages only about 670 this constitutes approximately one-half of the number. Since the adoption of this dual plan it has been noted that there has been more careful observation of the rules, more courteous treatment of passengers, and a reduction in the number of accidents of approximately 400 for the first 6 months of the year as compared with the same period the preceding year.

Notched Welds in Rail Head

This Design Is Intended to Prevent Failure of Seam-Welded Joints on Account of Shear and Impact Strain

IN THE USUAL method of seam welding rail joints, the rails are each separately welded to a joint plate so that all strains are transmitted from one rail to the other entirely through the plates. No provision is made for the shear and impact strain, due to the weight of the blow from the rolling wheels, with the result that the seam under the head of the rail on the receiving end of the joint often cracks just at the rail end. This crack may then extend progressively along the joint for its entire length and after the failure of this seam the other seams fail and the entire structure becomes disrupted and worthless. In most cases, however, where the initial cracking above described does not occur, the joint remains sound and useful.


Notch in Rail Head Is Filled with Welding Metal to Strengthen the Joint

In order to overcome this difficulty a joint has been designed by E. M. T. Ryder, way engineer Third Avenue Railway, New York City, wherein a notch as shown in the accompanying drawing is made in the head of the rail directly above the joint. This notch is of a depth equal to the thickness of the fish plate, and is filled with metal welded to the facing ends of the two rails and to the top of the joint plate. The metal within the recess is thus integral with the metal forming the weld between the joint plate and the two rails. With the grooved girder rail a second recess is formed on the other, or lip side, of the rail, but with tee rails it is thought to be undesirable to cut a notch and weld on the gage side.

The shape of the recess may be varied, depending upon the width and shape of the rail head, but it is not generally desirable to carry it entirely across the head, as not less than one half of the surface of the rail head which comes in contact with the wheel should be of the original metal in order to preserve an adequate supporting surface of uniform composition and to prevent the wear or cupping which might otherwise occur.

The continuity of metal between the two rail heads prevents the receiving rail from sinking below the level of the run-off rail under the weight of the car wheels, thus avoiding impact strains which are likely to crack the seam weld. The necessary longitudinal tensile and bending strength is provided by the seam weld throughout the length of the joint plate.

This joint is applicable to rails of any type. A patent has been granted Mr. Ryder for this joint.

Roller Bearings for Electric Cars in Germany

ROLLER bearings are being used with success on the electric cars in the city of Hagen, Germany, according to an article in *Verkehrstechnik* for June 27, 1924. These cars are of a single-truck type with 9-ft. 2-in. wheelbase and are equipped with two motors. When roller bearings were first used with this equipment, a smooth roller bearing running upon hardened and ground sleeves was used. Difficulty was experienced, however, as this type of bearing would not take lateral thrust such as occurs at the armature and axle bearings. In order to take this lateral thrust it was found necessary to arrange the bearing either with a pressure disk at the end, or with one ball bearing.

The difficulty was overcome by using roller bearings with collars. These collar-roller bearings are installed on the commutator end of the armature shaft, but a smooth roller bearing is used on the pinion end. The axle bearings of the motor, however, are both of the collar-roller-bearing type.

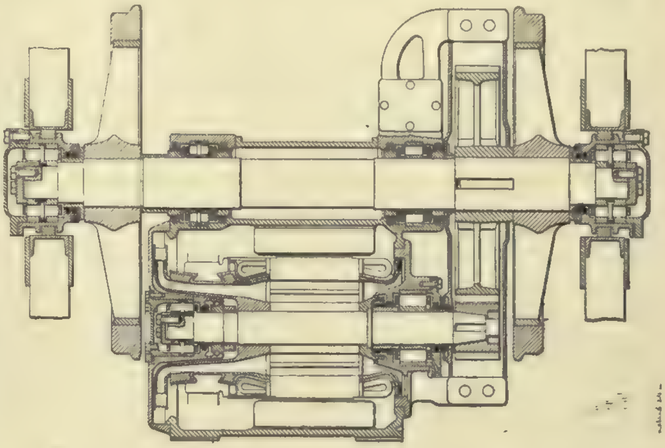
In the manufacture of these roller bearings particular attention is given to making them interchangeable, and all parts are drilled and machined in jigs. The inner race ring is pressed upon the end of the shaft, and held there with a cap and three chromium-nickel-steel bolts. The outer race is also pressed into the bearing housing, and is retained by a large cap which completely closes the bearing so as to make it dust and water tight. The smooth roller bearing, located on the gear end of the armature, is held firmly to the shaft by a shrink fit.

The roller bearings are lubricated with a high-grade grease, which has a melting point of 93 deg. C. Particular attention has been given to making the bearing tight so that the grease will not run out. To accomplish this an oil-throw ring, ¼ in. wide, has been placed next to the roller bearing with its periphery shaped so as to throw any melted grease back into the bearings. An annular cavity is also provided to receive any grease that might escape, and this cavity is formed so as to direct its contents toward the bearings. An additional provision employed to insure tightness consists of steel rings with cast-iron grooves which have very small clearance. The commutator end bearing has only a throw ring and a grease chamber.

Tests show that the use of roller bearings has reduced the energy consumption approximately 10 per cent. Also, there is less bearing wear so that the gear and pinion are kept accurately in mesh with less variation in the distance between the centers. There is also less side swaying of the motor. A further advantage has resulted from the increased period for lubrication.

The use of roller axle bearings was at first considered inadvisable, on account of the necessity to press off the wheels in order to install the bearings. Experience shows that the life of these bearings is as long as that of the wheels, so that it is seldom necessary to replace a bearing before the wheels are worn out.

Since 1922 all bearings on electric cars in Hagen have been equipped with roller bearings, and the first inspection was made 13 months afterward. At this time everything was found to be in satisfactory condition, and much of the original lubricant was still in the bearings.



Types of Roller Bearings Used for the Armature and Axles of Cars in Germany

Pins Indicate Accident Locations

INFORMATION concerning the accidents on the lines of the Worcester Consolidated Street Railway is readily available to the general manager from a map which hangs on the wall of his office. This shows on a comparatively large scale the track layout of the entire railway system. A pin is stuck into the map at the proper location whenever an accident happens. Five different color pins are used to denote different kinds of accidents, such as automobile collisions, boarding and alighting accidents, car collisions, etc. When an accumulation of pins occurs at some point the attention of the management is drawn to the number of accidents occurring there and investigations are made with a view to remedying the situation.

The Readers' Forum

Carbon Limit Is 0.7 per Cent

BRUSSELS, BELGIUM, Aug. 12, 1924.

To the Editors:

I notice in your issue of July 19, 1924, in which you give an abstract of my report at the recent International Congress in Paris, under the heading "Latest Development in Track Material," you make me say "For carbon content, 0.7 to 0.9 point is considered desirable." Actually, my report says: "Generally, the carbon content is limited to 0.7 per cent, and practically it is difficult to obtain even this figure, except in open hearth furnaces." I will appreciate publication of this correction in your pages.

E. D'HOOP,
Chief Engineer Brussels Tramways.

Association News & Discussions

Improvement in Car Equipment*

Ventilated Motors, Field Control, Regeneration, Gearing, Controllers, Resistors, Cars and Miscellaneous Equipment Are Considered—Much Credit Is Given to American Practice

By L. Ricaud
Manager of the Marseilles Lines of the French General Tramways Company

The maximum admissible heating in railway motors is limited by the resistance to charring of the cotton covering used for insulation. The use of mica and asbestos in place of cotton has raised the permissible motor temperature at the one-hour rating from 75 deg. C. to 120 deg. C. by thermometer as guaranteed by the French Thomson-Houston Company.

Results on impregnation of field coils in varnish, compound or Bakelite to the degree of "mummification" were obtainable only from American sources, all of which praised the idea highly. The Americans admit that repairs of such coils are very difficult, but they say: "What is the difference if impregnation avoids the need for repairs?" a reply which indicates that complete impregnation is of no value for old motors.

From R. E. Hellmund's articles in the May 1, 1915; May 15, 1915, and March 16, 1918, issues of the Electric Railway Journal, devoted to a discussion of ventilated motors, the following conclusions may be drawn as to the advantages accompanying the use of ventilated motors:

1. The ventilated motor is lighter than the non-ventilated motor for the same hourly rating.
2. A ventilated motor will have a continuous rating on stand test 25 per cent to 100 per cent greater than the same motor without ventilation. In service, however, the relative gain will be less on account of the outside ventilation.
3. Since the effectiveness of self-ventilation is determined by the motor speed, this feature is particularly valuable with high-speed armatures and for high-speed interurban service.
4. The worst condition for the self-ventilated motor is at starting. The air discharge through the fan is very small with the motor turning slowly, while at the same time it is carrying an overload and receiving an excessive quantity of heat.
5. The use of a separate motor-driven blower obviates the disadvantage just cited, but it appears suitable for locomotives only. With this arrangement the full length within the motor case may be used for the armature conductors, while with self-ventilation this is reduced.
6. The accidental entrance of water in small quantity is less harmful in a ventilated motor than in a non-ventilated motor, since it is evaporated and discharged by the current of air.

In the selection of ventilated motors, there are two dangers to be guarded against. If, in order to economize on weight, the equipment is calculated just sufficient to cover ordinary operation, there may be difficulty with abnormal service, such as operation with one motor cut out, pulling a damaged train or a snow plow. The mass of the motor being insufficient for storing the heat produced, it will reach an abnormal temperature. On the other hand, if the motor is calculated too large, it will operate too cool to evaporate the moisture which may penetrate within the case. It is very important to be certain that, during the wet season, the motors will attain a temperature in service of 50 to 60 deg. C. above the surrounding air, unless the motor can be run closed at such times. In all cases it is recommended that the ventilating openings in the case be closed during snow storms. If this is not done it is important to watch the discharge orifices to be sure they do not get clogged with dirt or ice.

America's experience with ventilated motors is most convincing. In Europe they are still in the experimental period, but the reports are satisfactory. Among European users are London, Leeds, Glasgow, The Hague, Amsterdam, Christiania, Copenhagen, Nice and Brussels. Barcelona has 188 equipments. Strasbourg is the only place which has given up self-ventilation, but the reason seems to be that the motors were of sufficient capacity without it.

Information furnished by all the motor builders shows that the adoption of ventilated motors permits the use of motors of the next smaller size. The economy in cost and in current from the lighter weight are quite important. In general, the large savings through the use of ventilated motors justify spending a portion in more careful maintenance, such as occasional blowing out of dirt, closure of orifices in snowy weather and periodical impregnation.

The advance of field control and interpole design has followed from the pioneer Pennsylvania Railroad locomotive motors down to the present day. Experiences with such motors were given in C. W. Squier's article in the Feb. 21, 1920, issue of Electric Railway Journal and the savings of the Chicago elevated lines were reported in the issue of the Journal for June 24, 1916. Rotterdam, Paris, Berlin and Turin are among tramway users, and Nimes and Remoulins among trolley-bus users, of field-control motors.

With regard to regenerative control, the use of the motors as generators cannot be depended on as the sole source of braking; and regenerative control is too costly and too complex to be used outside of the locomotive.

High-Speed Armatures Necessary for Light-Weight Motors

There is a double economy in reducing the weight of a motor of given nominal rating, since for a given service a motor of smaller power may be used. The reduction in weight has been obtained principally on account of increased armature speed, which has been made possible through the use of commutating poles. In a few cases a reduction in weight has resulted from the use of rolled steel in place of cast steel, and also by the use of small diameter gearing.

Improvements in Control, Gearing, Resistors, Etc.

Master or remote control is still limited to locomotives and large suburban or interurban cars, including the self-propelled type.

With regard to gearing, it appears that helical types are on trial at Hâvre, while Antwerp is securing satisfactory results from the Citroën herringbone type. The Hague reports that the wear on its Cincinnati Tool Steel pinions is inappreciable. In fact, Americans report that such pinions show a life of 250,000 instead of 25,000 miles. Paris, Lille, Marseilles, Naples, Liége and Bucharest are among users of gear rims which are shrunk instead of being keyed on. As the quality of these gears is improving, the desirability of using harder pinions increases.

Maag gears, noted for their exceptional cut and high polish, are on trial at Bordeaux, Marseilles, Turin, Warsaw and Brussels.

Non-rusting light-weight resistors are being tried by Paris and Warsaw despite the disadvantages of high cost, asserted greater fragility and less resistance to overloads.

A 4½-in. diameter, 3-lb. trolley wheel with graphite bushings is favored except, of course, by the many operators who prefer pantograph or bow collectors.

A trend is noted toward air-brakes, not for reasons of economy but rather of safety, particularly in high-speed train service. The Paris system has recently built a compressor operating at the motor speed, viz., 900 r.p.m. In comparison with the CP-27 type in use, there is asserted a weight saving of 30 per cent and an energy saving of 12 per cent. Compressors of this type are to be standard on the Type L cars.

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*Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

[The second half of the paper was devoted to light-weight rolling stock of recent American types, and included descriptions of the Bangor double-truck safety car, the Brooklyn City pay-enter pay-leave car, the Western Ohio interurban car and others. The economies of such constructions are admitted, but caution is advised with regard to maintaining a good factor of safety against overloads and collisions. —EDS.]

Truck and Bearing Practice*

Radial Axle Trucks Are Claimed to Have Some Advantages in European Practice—Ball and Roller Bearings Reduce Train Resistance Materially and Are Being Tried by Many Roads

By CH. HARMEL

Manager of the East-West Tramways of Liége, Belgium

THE use of radial axle trucks has been attempted by only 12 companies out of a total of 35 that replied to the author's questionnaire. Of these 12, five have used them on motor cars only, three on trailers only, and the remaining four on both motor cars and trailers. Only one company, the Prague Tramways, makes general use of radial axles. Hence it is difficult to draw practical conclusions as to their merits.

Regarding the desirability of using radial axles as compared with rigid axles, four companies replying found other advantages than the increased length of wheelbase possible for a two-axle car. The Prague Tramways mentioned the simplicity of the running gear, the ease of making changes, and the reduced cost of maintenance. The Hague Tramways found an increase in life of wheels. The Antwerp Tramways stated that the entrance of the car onto curves is smooth and regular. Curves of more than 100 ft. radius can be approached at speeds of 11 m.p.h. and over, while for curves of less than 100 ft. radius the speed needs to be reduced to 8.8 m.p.h. The weight of the car can be reduced 5 to 7 per cent.

Apart from the lightness of the long wheelbase car, the Antwerp Tramways has found that it gives a very easy action, free from swaying or galloping, with decreased fatigue to the passengers. The car wheels have given service of 62,000 miles against 50,000 miles with rigid axles. As a result this company has obtained a reduction in maintenance cost.

The results obtained on the Avenue line in Antwerp show that the radial axle cars making the trip empty averaged 26 minutes 50 seconds with a current consumption of 4.2 amp.-hr., while the rigid-wheel-base cars averaged 28 minutes 37 seconds and 5.2 amp.-hr. With full load the radial-axle car took 24 minutes 54 seconds, using 5.3 amp.-hr., as compared with 27 minutes 30 seconds and 6.8 amp.-hr. for the rigid-axle car. Thus the saving in energy is some 24 to 28 per cent, combined with a gain in time of 7 to 11 per cent in favor of the radial axles.

ANTI-FRICTION BEARINGS FAVORED

In reply to a questionnaire sent out by the author, 10 companies stated that they are using ball bearings on the car journals. Car resistance has been found very much less with ball bearings than with friction bearings, the London County Council Tramways, for instance, finding it reduced 55 per cent.

As to economy of current, the Antwerp Tramways found a reduction of 21 per cent in energy required. The Paris system found, under like conditions, a saving of 9 per cent in energy, while a train composed of motor cars with friction bearings and a trailer with ball bearings used 8 per cent less energy than an ordinary train with friction bearings throughout. Tests made at Neufchatel, Rotterdam and Geneva failed to show any economy of current.

Other advantages cited in the replies were: Higher schedule speed with the same power; less starting resistance and more rapid acceleration; economy of oil.

The replies from the nine companies making a trial of roller bearings contained comparatively little information. Only one company stated that it had found proof of a reduction in energy, and another mentioned that initial tests indicated the same thing but that a more complete series of tests was under way.

As to the use of these types of bearings for armatures, ball bearings were reported as used in 1,828 motors and roller bearings in 86. These bearings have been in use for various periods from three months up to 15 years. Only one company uses ball bearings for all armatures.

The replies indicated a life of 25,000 to 30,000 miles for friction bearings, the lowest being 6,000 miles and the highest 60,000 miles, which was obtained by the use of phosphor bronze. For ball bearings one company has operated up to 360,000 miles, another 180,000 miles and a third 42,000 miles, in the latter case without showing signs of wear. As to roller bearings, one company stated that it had bearings that had made 72,000 miles and the test was being continued. The others were not ready to report results.

Some of the principal advantages found by the companies using ball or roller bearings for armatures were: (1) Less inspection of motors for clearance; (2) elimination of bearings replacements and the difficult manufacture of bearings; (3) uniform motor clearance, and reduction of the air tap to 0.02 in (½ mm.); (4) increased output of the motor; (5) perfect centering of the armature and constant distance between the armature and the axle, better meshing and less wear of the gears; (6) elimination of damage to armatures through excessive bearing wear; (7) economy of lubrication; (8) reduction of static resistance; (9) improvement of mechanical operation; (10) reduction of time cars are out of service.

As to the economy in energy and in cost of maintenance with ball or roller bearings for the armatures, one company placed this at 25 per cent.

Difficulties found with bearings of these types were: (1) The difficulty of mounting and dismounting of the bearings resulting from the necessity of loosening them when changing commutators; (2) breakage of the balls, while quite rare, this may be eliminated in many cases by replacing the bearings by others quickly, or by replacing the balls by rollers; (3) with roller bearings, one company had difficulty in keeping the rollers parallel.

Other causes that have resulted in trouble with bearings are: Breakage of the roller cage support; corrugation of balls or the ball race; breakage of balls from axial thrust; breakage of balls from lack of lubrication; breakage of the inner race following pressing it on an axle with a tapered fit.

BALL AND ROLLER BEARINGS FOR ARMATURES

The majority of the companies that have tested ball or roller bearings for the armatures were in favor of extending their use for this purpose, at least for new equipment. Almost all of them likewise aimed to apply bearings of these types to old motors where desirable, and where the cost of mounting is not too great.

None of the companies that replied has tested either balls or rollers for the motor axle bearings.

In general, the causes of failure of these types of bearings in service on journals, as mentioned in the replies received, are: (1) Direct shocks that the balls or rollers have to stand without the intervention of any elastic medium between the wheel-and-rail contact and the collar on the axle; (2) transverse force acting laterally against the balls or rollers. These forces frequently are considerable, particularly at switch points or at the entrance to a curve.

To remedy the first difficulty the bearings have been strengthened by increasing the size of the balls or the number of the bearings, or by using rollers instead of balls. The solutions used to obviate the difficulties caused by the transverse shocks are quite varied. These include special collars or muffs that move axially with a certain amount of friction and various forms of coned and tapered mountings for the races.

The results obtained with ball or roller bearings for journals are in general quite satisfactory. Among the several companies making tests the Antwerp Tramways investigated starting resistance. For a car with friction bearings both for the journals and for the armature, figures of 40.8 and 35.26 lb. per ton were obtained, while for a car with ball bearings at both points, the mean of the corresponding figures was 4.98 lb. per ton. During the test the saving of oil indicated was 77 per cent in favor of the ball bearings.

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*Abstract of a report presented at the biennial meeting of the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Paris, June 16-21, 1924.

Tests on cars of the London County Council Tramways and the Wigan Corporation Tramways (described in ELECTRIC RAILWAY JOURNAL for April 21, 1923) show a reduction in energy consumption with roller bearings of 25.4 to 26 per cent below that with friction bearings, a reduction in running tractive effort of 19 to 54 per cent, and a reduction in starting resistance of 34 to 85 per cent.

Another study of bearings of these types was published by H. L. Whittemore and S. M. Petrenko in Technologic Paper No. 201 of the Bureau of Standards, Washington (1921).

Summing up the results obtained to the present time, certain companies have not obtained a reduction in motive force, and it appears that since others have proved that the energy consumption is reduced, the former are not obtaining the maximum results possible. Very few of the companies or of the manufacturers have attempted up to now to take care of lateral motion in the motor bearings or in the journals. The problem is not easy of solution, but without doubt the inventors will find an answer to overcome the difficulties.

At least one may conclude that from the results obtained up to the present time that the use of ball or roller bearings in both the armature and the journal bearings permits the following: (1) Reduction of tractive effort, both at starting and while in motion; (2) increase of the schedule speed, and reduction of the dead time, consequently a better coefficient of utilization for the equipment; (3) increased effective output of the motors, and reduction of the causes of failures; (4) reduction in cost of lubrication; (5) increased wear of the gears and pinions through better meshing, following exactness of the distance between centers.

The use of such bearings assures the parallelism of the armature shaft and the axle.

It may be mentioned that there is a marked tendency toward the use of rollers in preference to balls.

Finally, it is urged that not only those companies that have tested these new developments, but as many others as possible should obtain practical experience in a scientific manner and make available the results obtained.

Maintaining Electrical Equipment*

BY HENRY CORDELL

Master Mechanic Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

ON WHAT do we base wear and tear? Usage, of course. Still we find railroad companies who base the inspection of cars on days or months, as the case may be. This is as much out of line as inspection based on kilowatt-hour consumption. You could easily take a car in either case and put it up for inspection, without any mileage, or at least with a very low mileage. On systems where more than one car is used in trains, both of the above methods are apparently wrong, the first named because it may not be necessary to use two or three cars on certain days, therefore no exact time could be obtained when certain cars were due; in the second case, a car may be used as a single car one day and pull trailers the next, and the increased current used surely does not effect the brake rigging, wheels, brakeshoes, oiling, etc., of any of the electrical equipment in direct proportion to the wear we get per mile operated. Therefore, inspect on the mileage basis.

Obtaining the mileage daily from the transportation department not only gives the mechanical department the basis for inspection but supplies data which both departments may desire to work up. Cars are ordered out of service every 1,000 miles for regular inspection. At the accrued mileage of 100,000 order car off the road for general overhauling.

It is generally conceded that to obtain maximum service from electrical equipment, it must be kept clean. Compressed air, if dry, provides efficient means of cleaning out motors, switch group and controllers. Of equal importance are the contacts. The safe current load depends on the width of contact surface and the pressure applied. It is well to provide inspectors with small spring balance scales, so that proper tension may be carried on controller fingers and motor brushes—one pound per ⅛ inch of contact width on controller fingers and from 5 to 7 lb. per square inch on carbon brushes. All connections should be carefully inspected and tightened, and if there is any indication of unsoldering at the terminal don't neglect it. Electricity is not like water, it doesn't "take up," as the old boilermaker says.

There is a condition that needs special mention in regard to controller fingers. In most of the controllers two or more fingers are designed to make and break at the same time. Due to wear this condition needs careful watching and should never be permitted to change, or the last finger leaving contact will have to carry and break all current, which soon means destruction to the finger as well as to the drum segment. This is also the case where group switches are used, and switches designed to come in or go out together should be adjusted so that this takes place. Generally, binding of the mechanism or residual magnetism is responsible for any sluggishness in the switch.

Large orders placed annually for resistance grids are the direct result of poor inspection. If instructions were given to inspectors to use an 18-in. wrench and use all their strength with one hand when tightening up grid rod nuts, they would soon learn that the excuse of broken grids was only an alibi when cars are pulled in dead or jumping. The gentlemen who discovered the open-end grid and the increase of mica insulation on the rods, thereby sacrificing the necessary strength of the rod to keep grids in good contact, had quick repairs in mind. I believe that a careful investigation of the trouble which led to the redesigning of the grid and rods would have shown that poor contact between grids was the cause of the failures.

In assembling grids, see that contact faces are clean and bright, and better still, use soft copper washers between grids; see that terminals are machined straight, and I venture to say that you need no storeroom full of grids.

As to the motors on inspection. After being cleaned out, the brushes should be changed if needed, and if holders require renewals on account of wear this should be done. A loose holder, I mean loose for the brush, causes excessive arcing and possible flashovers. And not only that, but brush consumption is increased and general poor commutation results. Clearance should be taken between armature and pole pieces every inspection to ascertain the condition of bearings which may have worn to a point where renewals are required. Use a strip of leatheroid about ¾ in. wide of suitable length and thickness for this gage.

Leads to the motors cannot be protected from mechanical injury by means of conduit, due to truck swings, and they are subject to extremely hard usage. Inspect carefully and tape up worn places. I find that long leads fare better than short ones, and we permit leads to rest on motor cases, the only protection being a No. 12 steel wire armor. Don't omit to securely cleat cables at connectors to main wiring. If permitted to swing at the connection, they will break.

In multiple-unit operation extraordinary care of inspection of train-line cables for the control is required. These cables sometimes terminate in a receptacle on the dash; at other times in a receptacle mounted on the draft rigging, in which case they swing with it. This, of course, subjects the cable to severe twisting and it has been found that cables had to be made up of very fine wire, that is, a large number of fine wires equivalent to the carrying capacity required. We use seven strands of 23 wires each of No. 36 B. & S. gage copper wire. The insulation consists of paper wrapping, 1/16-in. pure rubber, and a single braid of cotton. The separate cables are assembled in a rubber-lined hose, leaving them plenty of freedom. This has proved entirely satisfactory. However, we discard the cables when cars go through the general overhauling, after 100,000 miles, to prevent any possible chance of failure.

The cables or jumpers from car to car are subjected to hard usage. The inspection of these jumpers proved quite a problem and we adapted a monthly inspection of all jumpers. After inspection and testing we paint the heads a certain color. For instance; January black, February white, March green and April red. The next month we go back to black and continue the rotation. The transportation department co-operates and uses only jumpers with proper colors after the tenth of the month, and returns all others to the shops.

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*Abstract of a paper presented at the meeting of railway section of the Wisconsin Utilities Association held at Madison, Wis., Aug. 15, 1924.

Current-collecting devices should be closely inspected and proper tension should be checked every inspection. We find that sliding contacts give good service and few wire derailments. The cost is also lower than wheels. We electrically weld all inserts that become worn, using a very hard material. After grinding to contour we case-harden them. We use 35-lb. tension against the wire on both slides and wheels. Low tension is more destructive to overhead than high tension because it permits wheels to fill up with copper, deposited by the arcing.

Before leaving the subject of inspection I wish to call your attention to lubrication of controllers. Don't use lots of oil. Put a little on the end of your finger, rub over the segments, turn controller around two or three times and wipe off with a clean cloth. Too much oil gathers dust and makes the controller gummy, hard to work, and destroys good contact, thereby increases burning of segments and fingers.

In slotting a commutator there seems to be divided opinion as to the carefulness in which it should be done. All mica should be removed to a depth of $\frac{1}{16}$ in. Use a saw about 0.005 in. wider than the thickness of the mica, and after completing grooving inspect carefully to see that no part of the mica is left standing due to side slipping of the saw.

The string bands at the end of the commutator should receive several coats of baking varnish. For several years we have covered the string bonds with wide bias linen tape covered with several coats of varnish. This makes a very smooth, easily cleaned surface and is very satisfactory.

Fields should be removed from shells and repaired if needed, dipped and baked. Fields wound on brass spools sometimes become "tin-canned," that is, the winding has become loose through vibration, and if impregnation facilities are not available, dipping and baking will go a long way to restore them to useful service without rewinding.

Years ago we had lots of trouble with loose fields and we put an anchor clamp between the fields. The clamps rest on the field spools and the bolt goes through the shell with a nut on the outside. This stopped all loose field trouble.

In conclusion, let me say that irrespective of the amount of work done on the equipment on inspection or overhauling, test it before turning a car over to your transportation department. Nothing causes more friction than car failures, not only departmental but between the railway and the patrons. The success of a road depends on the class of service rendered, and the transportation department, no matter how good, cannot give fast and uninterrupted service unless the mechanical department hits the ball.

Growing Traffic and Ample Rates*

By B. C. Cobb
Vice-President Hodenpyl, Hardy & Company, Inc.

FINANCIAL success in any business is regulated by two factors: First, there must be a market for the product. Second, the price must be sufficient to pay all costs, plus a reasonable return on the capital invested. The electric railway business is no exception to this fundamental economic law. On these factors rests the permanency of the electric railway as a public servant.

It has gradually become apparent that neither the street car nor the motor bus by itself can give the public in most of our cities the combination of pleasure and utility it desires in all year round transportation facilities. Each form of transport has certain operating limitations and advantages over the other. Conditions vary of course with the character and size of the city served, but generally speaking it has been found that the electric railway can carry a larger number of people in a given time over more extended areas than any other form of surface transportation. It has also been found that street railway operating costs under traffic density conditions usually are lower than those of the motor bus.

Traffic density and congestion in many of our cities makes the electric railway the best and most economical form of mass transportation known. Outside of the rush hours, however, and in sparsely settled portions of a city the motor bus at present has an advantage, but this advantage cannot be considered permanent as the time surely will come when the motor bus will be obliged to pay a proper proportion of the cost of maintaining the roadbed provided by the public. Furthermore, the motor bus eventually will come under regulations as to schedules and routes similar to those that now apply to the electric railway. In other words, the bus cannot always expect to select the routes and time it desires to operate, but as a public utility it must be organized to give city-wide transportation service at regular intervals of the day or night whether or not any passengers are waiting on the corner to be picked up.

The electric railways under proper franchise restrictions and requirements, with their organization, equipment and years of experience—all of which represent the investment of between $5,000,000,000 and $6,000,000,000 — are preeminently the best qualified to, and should operate in the interests of the traveling public, such motor buses as may be required to round out and improve existing city transportation systems.

The mere combination of the electric railway and the motor bus, however, is not going to entirely solve the problem of city transportation. Both electric railways and motor buses are confronted with an exceedingly serious problem, and until it is solved or relief is granted from present conditions the matter of rendering quick, efficient and dependable transportation in cities is going to be increasingly difficult. I refer to the traffic congestion caused by privately owned automobiles.

When one considers the tremendous waste of time and money and the great personal inconvenience caused to a large portion of a city's population on account of traffic congestion it seems almost unbelievable that more and better organized steps have not been taken to remedy conditions. It has been proposed in some instances to widen the main streets of cities, but as a practical matter this cannot very well be done and if done would involve the expenditure of large sums of money which would have to be raised by taxation—and most people rightfully believe that the taxation business has about reached the limit of financial endurance. Much relief could easily be given, however, if city authorities would see to it that street cars, on account of their carrying such a large number of people, are given precedence over every other form of street traffic. This regulation should be enforced by making it a misdemeanor punishable by arrest and fine of anyone who unnecessarily interferes with the progress of a street car—a condition which exists today in Cleveland.

I do not fear that the motor bus will replace the electric railway in the larger cities for, contrary to the opinion of many people, the revenue passengers carried per capita in such cities last year showed material increases over 1910, and in some instances increases over 1922. This is of considerable significance when we remember that in 1910 there were only 468,000 motor vehicles of all sorts registered as compared with approximately 15,000,000 at the end of the year 1923. It also surely is of interest to know that in 1923 the electric railways of this country carried approximately 16,000,000,000 passengers, or in other words more passengers than in any other year in their history. This very clearly demonstrates the economic need and usefulness of the industry.

A better feeling of good will on the part of the public and the authorities has manifested itself through adjustment of fares to meet increased operating costs and taxes, the elimination of unfair motor bus and jitney competition, and relief from burdensome franchise restrictions. Thus the two old fundamentals of sufficient market and adequate rates have begun again to assert themselves. These things, together with a public more friendly than it has ever been before because of its better grasp of the electric railway situation, surely should make traction men face the future with renewed courage.

Berlin Railroad Congress

A CONVENTION and exhibit of railway material is to be held in Berlin, Germany, Sept. 21 to Sept. 27, under the auspices of the Verein Deutscher Ingenieure. It is expected that there will be on exhibition more than

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*Abstract of a paper presented at the eleventh annual conference of the Babson Organization, Babson Park, Mass., Aug. 8, 1924.

100 modern types of locomotives, including many electric locomotives and other types of rolling stock. The entire session one morning will be given up to the electric traction topics.

Set Your Own House in Order*

By A. E. Scott
Director of Public Relations, Interstate Public Service Company

IF A UTILITY company contemplating a plan for the improvement of relations with the public, proceeds with the idea that all the work necessary must be done with the public, then that company is making a great mistake. It is entirely wrong to assume all the fault for an adverse public sentiment lies with the public. No company will ever get anywhere on that theory. The management is not all of the company. It must not make the mistake of assuming that because it is doing its best to maintain proper relations with its public, every one else associated is doing the same thing. Too many executives are not sufficiently informed as to the every-day conduct of their employees. Too many do not know the shortcomings of their own organization. They are too close to see the inefficiencies and the internal causes of trouble.

If I were called upon to improve public relations for any public utility company I would begin with the company organization and not with the public. I would first set my own house in order. This is not only advantageous, it is necessary. Necessary because, if good public relations are to be had it must be through the active interest of everyone in the organization from the president down, and advantageous because much can be done with the entire force of employees back of any movement. Each man or woman has his or her influence and can add to the sum total of good results. It will not be difficult to create and maintain good public relations when every man working for the public utility company is constantly doing his part.

Enlisting the interest and assistance of each individual employee must be done in a systematic, organized way, under a definite plan, just as definite as are the other organized efforts for operation, stock selling, or new business. Committees and group meetings are of value in carrying on this work with employees. Committees to supervise and plan the work, group meetings as the means for getting in touch with each individual employee. Education is a most important force in public relations, and employees can best be educated by the machinery provided by committee and group meetings.

It is necessary first to establish within the organization of employees, a knowledge of the utility, the importance of good service and courtesy, and supplying the public with such information that they may have a better understanding of the utility business in general.

Having set our own house in order we are now faced with the second step in our activities and are confronted with this question: How shall we deal with the public in completing our job? Here again we must be honest and sincere and must have a definite, logical and practical plan.

The program for carrying on the work with the public should be designed to bring to the public information concerning public utility business and public utility problems, so that the people may understand these things and be made to appreciate more fully their own personal interest in them. For the presentation of this program, the company, having prepared its own organization, will have the whole body of employees properly equipped and anxious to perform their part. Thus, the responsibility will not rest entirely on the executives and those specially charged with the public relations work. Instead of having one or a dozen men working for better relations, the whole force will be interested and at work.

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*Abstract of a paper presented at the meeting of the Central Electric Railway Accountants' Association, Cleveland, Ohio, Aug. 15, 1924.

Traffic Safety Conference

INITIAL plans for a procedure to check highway and street accidents were discussed at a meeting of the committee on public relations of the Conference on Street and Highway Safety, held in Washington on Aug. 11. The chairman of the committee is George M. Graham, of the Chandler Motor Car Company. J. P. Barnes, president Louisville Railway, was present representing the American Electric Railway Association. Other members represented the steam railroads, taxicab interests, highway commission, casualty insurance companies, National Safety Council, etc. Col. A. B. Barber, director of the conference, was also present.

Discussion brought out the fact that there are many communities in the country today which are bewildered as to the best method of meeting the problem of accidents due to traffic. The conflicting laws of the different states on the subject add to the confusion.

American Association News

Foreign Operation Committee Returns

THE special committee on foreign operation appointed by the executive committee last June returned to New York on Aug. 29 on the steamship *Berengaria* after a trip of over seven weeks, having left this country on July 9. This committee consists of James W. Welsh, executive secretary American Electric Railway Association; Harley A. Johnson, assistant to general manager Chicago Rapid Transit Company and president of the American Electric Railway Engineering Association, and Harry L. Brown, editor ELECTRIC RAILWAY JOURNAL.

A study of electric railway conditions in a number of European cities has been made. Among the principal cities visited by the committee were London, Liverpool, Manchester, Glasgow, Edinburgh, Leeds, Paris and Bern. The British Empire Exposition at Wembley was also inspected. The committee is now preparing a report of its findings, which will be presented at the convention of the association next October.

Proposed Change in Constitution

AN IMPORTANT change in the membership clause of the Constitution of the American Association, and in the corresponding clause of the by-laws, has been proposed in order to permit the membership of subsidiaries of member companies operating buses or other forms of transportation and that are now not eligible to membership in the association.

The proposed constitutional amendment would change Article IV, Section (a), by the insertion of the words in italics so that it will read as follows:

IV. The membership of this Association shall consist of five classes as follows:

(a) Company members, consisting of American companies, operating urban and interurban railways, *and subsidiaries of such companies operating other forms of transport*, or lessees or individual owners of urban and interurban railways *and of such subsidiaries thereof*, or steam railways having electrified sections, and of companies, firms or individuals engaged in the business of manufacturing or selling materials for such electric railways or otherwise—subject to the approval of the Executive Committee—intimately related to electric railway operations.

(American, as here used, shall be understood to mean: Located inside the United States of America and its possessions, Canada and Mexico.)

Each company member shall be entitled to one vote, which shall be cast by its properly accredited delegate, and its representatives shall be entitled to hold office in the Association.

The proposed change in the by-laws would amend Article XVI, Section (c), to read as follows:

XVI. (c) Operating member companies shall pay in advance annual dues in accordance, except as to minimum and maximum, with the amount of their gross receipts from electric railway operation *and other forms of transportation service* during the preceding fiscal year of the respective members, as follows:

(Here follows present schedule of dues.)

Registration and Transportation Convention Plans

INFORMATION is being sent out from Association Headquarters to all members giving information regarding the Atlantic City convention to be held on Young's Million Dollar Pier Oct. 6 to 10. This includes advance registration cards, for the convenience of members, and identification railroad ticket certificates.

All of the trunk line passenger associations of the country have authorized the sale of round trip tickets to the convention at the rate of 1⅓ times the one-way fare on presentation of the certificate when the ticket is purchased at a local office. Tickets may be purchased for the going trip beginning Oct. 2 to 8 inclusive, and the return trip may be made leaving Atlantic City up to Oct. 16 inclusive, but must be by the same route as the going trip. The return ticket issued at the reduced fare will not be good on any limited train on which such reduced fare transportation is not honored. Stop-over privileges are provided in accordance with certain regulations which can be ascertained from the local agent.

Tickets will be validated at Atlantic City after arrival by agents of lines over which tickets read into Atlantic City.

Convention Programs of the American and Affiliated Associations

(Corrected by the Association up to Aug. 28)

Monday, Oct. 6, to Friday, Oct. 10

All Sessions to Be Held at Young's Million Dollar Pier, Atlantic City, N. J.
Registration Headquarters on the Pier Will Be Open Saturday, Oct. 4, and Sunday, Oct. 5.

AMERICAN ASSOCIATION

Monday Morning, Oct. 6.

9:30 A.M. to 12:30 P.M.

REGISTRATION.

Tuesday Morning, Oct. 7.

10 A.M. to 1 P.M.

Meeting Held in Greek Temple

Subject: FINANCE.

ADDRESS OF THE PRESIDENT.

REPORT OF THE EXECUTIVE COMMITTEE.

REPORT OF THE EXECUTIVE SECRETARY.

REPORT OF THE TREASURER.

APPOINTMENT OF COMMITTEE ON RESOLUTIONS.

REPORTS OF COMMITTEES:

Finance—J. H. Pardee, president the J. G. White Management Corporation, New York City, chairman.

Policy—J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., chairman.

National Relations—C. L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis Ind., chairman.

Committee of One Hundred—Guy E. Tripp, chairman board of directors Westinghouse Electric & Manufacturing Company, New York City, chairman.

Special Taxes—W. H. Maltbie, special counsel The United Railways & Electric Company, Baltimore, Md., chairman.

National Council'or U. S. Chamber of Commerce—J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., representative.

Advisory Committee on Electric Railway Finance—A. L. Loomis, vice-president Bonbright & Company, Inc., New York City, chairman.

PAPER—"Financing of Electric Railways," by Allen G. Hoyt, vice-president National City Company, New York City.

PAPER—"Financing of Electric Railways," by J. P. Harris, vice-president Union Trust Company, Cleveland, Ohio.

PAPER—"Customer and Employee Ownership of Electric Railways," by Prof. T. N. Carver, Harvard University, Cambridge, Mass.

Formal Discussion on "Customer Ownership"; C. W. Kellogg, Stone & Webster, Inc., Boston, Mass.; Fred Scheel, vice-president Utility Securities Company, Chicago, Ill.

Tuesday Evening, Oct. 7.

GENERAL EVENING SESSION

Meeting Held in Ball Room

Arrangements are being made for addresses by prominent speakers. It is planned to broadcast these addresses by radio.

Wednesday, Oct. 8.

Inspection of Exhibits

This entire day has been set aside by the officers of the association for the inspection of manufacturers' exhibits. No formal convention sessions of the American Association or the affiliated associations will be held.

The official business of the day is the inspection of exhibits and every delegate is urged to take advantage of the opportunity to visit the manufacturers' booths where the most modern equipment and latest appliances are on display.

Thursday Morning, Oct. 9.

10 A.M. to 1 P.M.

Meeting held in Greek Temple.

Subject: CO-ORDINATION.

REPORT OF COMMITTEE ON NOMINATIONS—C. D. Emmons, president The United Railways & Electric Company, Baltimore, Md., chairman.

ELECTION OF OFFICERS.

REPORTS OF COMMITTEES:

Valuation—F. W. Doolittle, vice-president The North American Company, New York City, chairman.

Discussion.

Unification and Co-ordination of All Forms of Local Transportation—G. A. Richardson, vice-president and general manager Chicago Surface Lines, Chicago, Ill., chairman.

Discussion.

PAPER — "Co-ordination of Motor Vehicle and Electric Railway Service by Electric Railway Companies," by A. J. Brosseau, secretary and director National Automobile Chamber of Commerce; president Mack Trucks, Inc., New York City.

PAPER — "Co-ordination of Motor Vehicle and Electric Railway Service by Electric Railway Companies," by Paul Shoup, president Pacific Electric Railway, San Francisco, Cal.

ADDRESS — "Relation of Municipal Officers to the Utility," by Mayor William A. Magee, Pittsburgh, Pa.

ADDRESS — "Necessity of Electric Railways to Communities," by L. F. Eppich, past president National Association of Real Estate Boards, Denver, Col.

ADDRESS — "Necessity of Electric Railways to Communities," by W. D. B. Ainey, chairman Public Service Commission of Pennsylvania, Harrisburg, Pa.

ADDRESS—"The Future of Electric Railways in Great Cities," by Gerhard M. Dahl, chairman board of directors Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

PAPER—"Muscle Shoals," by Robert G. Gordon, Louisville, Ky.

Friday Morning, Oct. 10.

10 A.M. to 1 P.M.

Meeting held in Greek Temple.

Subject: MANAGEMENT.

REPORTS OF COMMITTEES:

Community Section, Company Section and Individual Membership—C. E. Morgan, vice-president and general manager Brooklyn City Railroad, Brooklyn, N. Y., chairman.

Company and Associate Membership—R. P. Stevens, president Republic Railway & Light Company, New York City, chairman.

Co-operation with State and Sectional Association—J. P. Barnes, president Louisville Railway, Louisville, Ky., chairman.

Publicity—W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill., chairman.

Publications—L. S. Storrs, president The Connecticut Company, New Haven, Conn., chairman.

Co-operation with Manufacturers—E. F. Wickwire, vice-president Ohio Brass Company, Mansfield, Ohio, chairman.

Education—Edward Dana, general manager Boston Elevated Railway, Boston, Mass., chairman.

Indeterminate Franchises — Edwin Gruhl, vice-president and general manager The North American Company, New York City, chairman.

Insurance—John T. Staub, treasurer United Railways & Electric Company, Baltimore, Md., chairman.

Mail Pay—L. H. Palmer, vice-president and general manager, United

Railways & Electric Company, Baltimore, Md., chairman.

Rapid Transit—William S. Menden, president Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., chairman.

Uniform Regulatory Laws—A. W. Brady, president Union Traction Company of Indiana, Anderson, Ind., chairman.

Coffin Prize Award—Britton I. Budd, president Chicago Rapid Transit Company and Chicago, North Shore & Milwaukee Railroad, Chicago, chairman.

City Operation — H. B. Flowers, president New Orleans Public Service, Inc., New Orleans, La., chairman.

Interurban Operation—Harry Reid, president Interstate Public Service Company, Indianapolis, Ind., chairman.

Foreign Practice—J. W. Welsh, executive secretary American Electric Railway Association, New York City, chairman.

CLAIMS ASSOCIATION

Meetings held in Claims Room

Monday Afternoon, Oct. 6.

2 to 5:30 P.M.

ADDRESS OF THE PRESIDENT.

REPORT OF EXECUTIVE COMMITTEE.

REPORT OF SECRETARY-TREASURER.

APPOINTMENT OF COMMITTEE ON NOMINATIONS.

REPORT OF COMMITTEE ON UNIFORM GRADE CROSSINGS LAW—William G. Fitzpatrick, general claims attorney Detroit United Railway, Detroit, Mich., chairman.

Discussion.

REPORT OF COMMITTEE ON CLAIMS DEPARTMENT ASPECTS OF MOTOR BUS OPERATION—G. T. Hellmuth, claims attorney Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., chairman.

Discussion.

REPORT OF COMMITTEE ON ACCIDENT PREVENTION—H. O. Allison, commercial manager Beaver Valley Traction Company, New Brighton, Pa., chairman.

Discussion.

PAPER—"What Can the Claim Agent Do Toward Encouraging a Better Relationship with the Employees of the Company and with the Public," by Col. H. G. Winsor, superintendent of investigations and adjustments Tacoma Railway & Power Co., Tacoma, Wash.

General Discussion.

Tuesday Afternoon, Oct. 7.

2 to 5:30 P.M.

MEDICAL AND SURGICAL SESSION

REPORT OF COMMITTEE ON MEDICAL AND SURGICAL WORK—Hart E. Fisher, chief surgeon Chicago Rapid Transit Company, Chicago, chairman.

PAPER—"A Few Questions on Eye Hazards in Welding," by Hart E. Fisher chief surgeon Chicago Rapid Transit Company, Chicago, Ill.

PAPER — "Problematical Industrial Hernia," by S. R. Benedict, chief surgeon Alabama Power Company, Birmingham, Ala.

PAPER — "Malingering," by F. L. Mosser, surgeon Third Avenue Railway System, New York City.

PAPER — "Organization of Medical Department," by J. J. Wymer, surgeon New Orleans Public Service, Inc., New Orleans, La.

PAPER — "Medical Survey of Employees," by Alden Coffey, chief surgeon Northern Texas Traction Company, Fort Worth, Tex.

PAPER—"Periodical Re-examination," by E. W. Miller, chief surgeon The Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

PAPER — "Hospital Association," by H. M. Bascom, chief surgeon Illinois Traction, Inc., Peoria, Ill.

PAPER—"Pelvis Fractures," by J. A. Watts, chief surgeon San Antonio Public Service Company, San Antonio, Tex.

PAPER — "Co-operative Hospitalization for Corporations," by F. S. Macy, physician-in-charge Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

Wednesday, Oct. 8.

Inspection of manufacturers' exhibits. See announcement in American Association program.

Thursday Afternoon, Oct. 9.

2 to 5:30 P.M.

PAPER — "Automobile Hazard," by Charles B. Hardin, general claim agent United Railways of St. Louis, St. Louis, Mo., chairman.

Formal Discussion—H. K. Bennett, safety manager United Electric Railways, Providence, R. I.

General Discussion.

PAPER — "Prevention of Highway Crossing Accidents," by H. A. Rowe, chairman committee on prevention of highway crossing accidents, American Railway Association, New York City.

General Discussion.

REPORT OF COMMITTEE ON RESOLUTIONS—William Tichenor, claim agent Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., chairman.

REPORT OF COMMITTEE ON NOMINATIONS.

ELECTION OF OFFICERS.

INSTALLATION OF OFFICERS.

PRESENTATION OF PAST-PRESIDENT'S BADGE.

ACCOUNTANTS' ASSOCIATION

Monday Morning, Oct. 6.

9:30 A.M. to 12:30 P.M.

REGISTRATION.

Afternoon

2 to 4:30 P.M.

Meeting held in Accountants' Room.

ADDRESS OF THE PRESIDENT.

REPORT OF THE EXECUTIVE COMMITTEE:

REPORT OF SECRETARY-TREASURER.

APPOINTMENT OF CONVENTION COMMITTEES:

(*a*) *Resolutions.*
(*b*) *Nominations.*

PRESENTATION by I. A. May, Comptroller The Connecticut Company, of a proposed Code of Ethics for adoption by the American Electric Railway Accountants' Association.

Discussion.

REPORT OF COMMITTEE REPRESENTING THE ACCOUNTANTS' ASSOCIATION AT THE ANNUAL CONVENTION OF THE NATIONAL ASSOCIATION OF RAILWAY AND UTILITY COMMISSIONERS—W. L. Davis, auditor Lehigh Valley Transit Company, Allentown, Pa., chairman.

Discussion.

REPORT OF COMMITTEE ON STANDARD CLASSIFICATION OF ACCOUNTS—Robert N. Wallis, treasurer Fitchburg & Leominster Street Railway, Fitchburg, Mass., chairman.

Discussion.

REPORT OF COMMITTEE ON STORES ACCOUNTING—R. A. Weston, special accountant The Connecticut Company, New Haven, Conn., chairman.

Discussion.

Tuesday Afternoon, Oct. 7.

2 to 4:30 P.M.

Meeting held in Engineering Room

JOINT SESSION 2:00 P.M. to 2:30 P.M., ENGINEERING AND ACCOUNTANTS' ASSOCIATIONS.

REPORT OF JOINT COMMITTEE ON ENGINEERING-ACCOUNTING — L. R. Brown, office and field engineer New York State Railways, Rochester, N. Y. and G. F. Dinneen, auditor Holyoke Street Railway, Holyoke, Mass., co-chairmen.

Discussion.

At the close of the discussion of the above report, the members of the Accountants' Association will adjourn to their meeting room where the Accountants' session will be continued.

PAPER — "Suggestions on Segregations in Cost Accounting from the Viewpoint of the Manufacturer in Reference to Maintenance Accounts," by Henry S. Day, manager transportation division Westinghouse Electric & Manufacturing Company, Boston, Mass.

Discussion.

PAPER—"Accounting as Related to Administration and Proprietorship," by Homer A. Dunn, Haskins & Sells, New York City.

Discussion.

Wednesday, Oct. 8.

Inspection of manufacturers' exhibits. See announcement in American Association program.

Thursday Afternoon, Oct. 9.

2 to 4:30 P.M.

Meeting Held in Accountants' Room

PAPER—"Electric Railway Balance Sheets," by C. B. Couchman, Certified Public Accountant, New York City.

REPORT OF COMMITTEE ON RELATIONS WITH OTHER ASSOCIATIONS — M. W. Glover, general auditor West Penn Railways, Pittsburgh, Pa., chairman.

REPORTS OF CONVENTION COMMITTEES:

(*a*) *Resolutions.*
(*b*) *Nominations.*

ELECTION OF OFFICERS.

INSTALLATION OF OFFICERS.

PRESENTATION OF PAST-PRESIDENT'S BADGE.

ENGINEERING ASSOCIATION

Meetings Held in Engineering Room

Monday Afternoon, Oct. 6.

2 to 5:30 P.M.

ADDRESS OF THE PRESIDENT.

REPORT OF THE EXECUTIVE COMMITTEE.

REPORT OF SECRETARY-TREASURER.

APPOINTMENT OF CONVENTION COMMITTEE ON RESOLUTIONS.

REPORTS OF COMMITTEES:

Special Committee on Unit Basis of Voting on Standards—C. S. Kimball, engineer way and structures, Washington Railway & Electric Company, Washington, D. C., chairman.

Special Committee on Engineering Manual—R. C. Cram, engineer surface roadway Brooklyn-Manhattan Transit Corp., Brooklyn, chairman.

Special Committee on Engineering Symbols—W. F. Graves, chief engineer Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., chairman.

Discussion.

Special Committee on Air Reservoir Specifications—R. H. Dalgleish, chief engineer The Capital Traction Company, Washington, D. C., chairman.

Discussion.

Committee on Heavy Electric Traction—J. C. Davidson, engineer electric traction Norfolk & Western Railway, Bluefield, W. Va., chairman.

Discussion.

Committee on Wood Preservation—A. P. Way, electrical engineer American Electric Power Company, Philadelphia, Pa., chairman.

Discussion.

Committee on Building and Structures—N. E. Drexler, chief engineer Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., chairman.

Discussion.

Special Committee on Car and Carhouse Wiring—H. H. Adams, superintendent shops and equipment Chicago Surface Lines, Chicago, Ill., chairman.

Discussion.

Tuesday Afternoon, Oct. 7.

2 to 5:30 P.M.

JOINT SESSION 2:00 P.M. TO 2:30 P.M., ENGINEERING AND ACCOUNTANTS' ASSOCIATION.

REPORT OF JOINT COMMITTEE ON ENGINEERING-ACCOUNTING — L. R. Brown, office and field engineer New York State Railways, Rochester, N. Y. and G. F. Dinneen, auditor Holyoke Street Railway, Holyoke, Mass., co-chairmen.

Discussion.

At the close of the discussion of the above report, the members of the Accountants' Association will adjourn to their meeting room and the session of the Engineering Association will be continued.

REPORT OF THE COMMITTEE ON UNIFICATION OF CAR DESIGN—H. H. Adams, superintendent shops and equipment Chicago Surface Lines, Chicago, Ill., chairman.

Discussion.

REPORT OF COMMITTEE ON EQUIPMENT—F. H. Miller, vice-president Louisville Railway, Louisville, Ky., chairman.

Discussion.

REPORT OF COMMITTEE ON WAY MATTERS—H. H. George, engineer maintenance of way Public Service Railway, Newark, N. J., chairman.

Discussion.

REPORT ON WELDED RAIL JOINT RESEARCH—W. W. Wysor, chief engineer United Railways & Electric Company, Baltimore, Md., chairman sub-committee No. 5, committee on way matters.

Discussion.

Tuesday Afternoon, Oct. 7.

PURCHASING AGENTS AND STOREKEEPERS

Session held under the auspices of the Committee on Purchases and Stores, Engineering Association.

2 TO 4 P.M.

ADDRESS OF WELCOME—H. A. Johnson, president American Electric Railway Engineering Association; assistant to the general manager Chicago Elevated Railroads, Chicago, Ill.

ADDRESS—"What the Purchasing and Stores Departments Can Do in Building Up Good Will for the Company." Speaker to be announced later.

Discussion.

REPORT OF THE COMMITTEE ON PURCHASES AND STORES—Jackson P. Dick, assistant to the vice-president and general manager Georgia Railway & Power Co., Atlanta, Ga., chairman.

Discussion.

PAPER—"The Economic Importance of a Well Regulated Supply Department in the Life of a Street Railway Company," by C. A. Harris, general storekeeper Pittsburgh Railways, Pittsburgh, Pa.

Discussion.

PAPER — "Proper Co-operation Between the Purchasing and Stores Departments and the Operating Department — from the Engineer's Standpoint," by L. C. Datz, chief engineer Memphis Power & Light Company, Memphis, Tenn.

PAPER — "Proper Co-operation Between the Purchasing and Stores Departments, and the Operating Department—from the Purchasing Agent's Standpoint," by Harry M. Lloyd, purchasing agent Indianapolis Street Railway, Indianapolis, Ind.

Discussion.

Wednesday, Oct. 8.

Inspection of manufacturers' exhibits. See announcement in American Association program.

Thursday Afternoon, Oct. 9.

2 TO 5:30 P.M.

REPORTS OF COMMITTEES:

Committee on Power Generation and Conversion—L. D. Bale, superintendent of substations Cleveland Railway, Cleveland, Ohio, chairman.

Discussion.

Committee on Power Transmission and Distribution—C. H. Jones, electrical engineer Chicago Rapid Transit Company, Chicago, Ill., chairman.

Special Committee on Automatic Substations—W. E. Bryan, superintendent of power United Railways of St. Louis, St. Louis, Mo., chairman.

Discussion.

Committee on Purchases and Stores—Jackson P. Dick, assistant to vice-president Georgia Railway & Power Company, Atlanta, Ga., chairman.

Discussion.

Committee on Resolutions.

Committee on Nominations.

ELECTION OF OFFICERS.

INSTALLATION OF OFFICERS.

PRESENTATION OF PAST-PRESIDENT'S BADGE.

Note: The action of the committee on standards will be presented immediately following each recommendation of a standing committee in which the Engineering Manual is involved.

TRANSPORTATION AND TRAFFIC ASSOCIATION

Meetings held in Transportation and Traffic Room

Monday Afternoon, Oct. 6.

2 TO 5:30 P.M.

ADDRESS OF THE PRESIDENT.

REPORT OF EXECUTIVE COMMITTEE.

REPORT OF THE SECRETARY-TREASURER.

APPOINTMENT OF CONVENTION COMMITTEES:

(*a*) *Resolutions.*

(*b*) *Nominations.*

REPORT OF COMMITTEE ON ACCIDENT PREVENTION—Charles W. Chase, president Gary Street Railway, Gary, Ind., chairman.

Discussion.

REPORT OF COMMITTEE ON DEVELOPMENT OF NEW BUSINESS—F. W. Shappert, traffic manager Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., chairman.

Discussion.

Tuesday Afternoon, Oct. 7.

2 TO 5:30 P.M.

ADVERTISING AND PUBLICITY SYMPOSIUM

A number of men who have been eminently successful will participate in this symposium. Their names will be announced later.

REPORT OF COMMITTEE ON TRACKLESS VEHICLE OPERATION—W. J. Flickinger, assistant to the president the Connecticut Company, New Haven, Conn., chairman.

Discussion.

Wednesday, Oct. 8.

Inspection of manufacturers' exhibits. See announcement in American Association program.

Thursday Afternoon, Oct. 9.

2 TO 5:30 P.M.

REPORT OF COMMITTEE ON RELIEF OF TRAFFIC CONGESTION—Paul E. Wilson, secretary Cleveland Railway, Cleveland, Ohio, chairman.

Discussion.

GENERAL BUSINESS.

REPORTS OF COMMITTEES:

(*a*) *Resolutions.*

(*b*) *Nominations.*

ELECTION OF OFFICERS.

INSTALLATION OF OFFICERS.

PRESENTATION OF PAST-PRESIDENT'S BADGE.

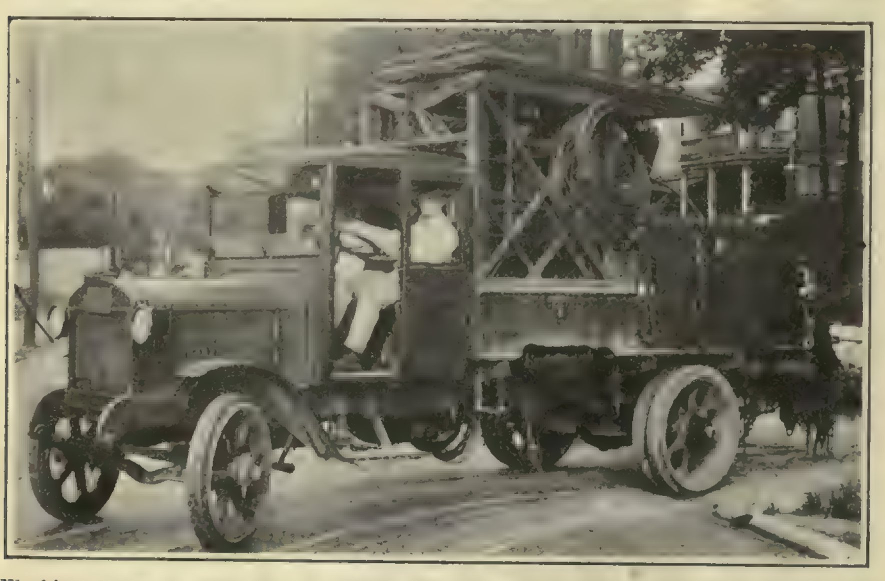
Maintenance of Equipment

Truck for Line Construction and Maintenance

A HEAVY-DUTY truck is giving satisfaction on line work on the Kansas City Railways, Kansas City, Mo. The truck illustrated is a General Motors Company 3½-ton chassis of 114-in. wheelbase motored to 51 hp., and capable of a speed of 40 m.p.h.

The truck, as equipped, has a capacity of 11 tons and several features were incorporated in the body construction for the convenience and comfort of the crew. It has a triple extension deck and ample compartment for a full complement of tools and materials. The tool boxes, being built longitudinally on the inside of the bed, serve also as seating space for the crew, which consists of from five to 12 men, depending on the class of work that is being done. Five men are used as a rule in maintenance work, while larger crews are usually employed in construction work.

A completely inclosed cab is also a feature of the truck, insuring comfort to the driver in severe weather. The deck elevation has a maximum of approximately 21 ft.; the platform is 4 ft. x 7½ ft. This particular truck has been in service since March of this year and has proved highly satisfactory. The big trucks are used exclusively in construction and maintenance work—that is, they are rarely called upon in emergency cases, lighter equipment being provided for such work.



Working Crews of from Five to Twelve Men Accompany This Heavy-Duty Line Truck Used in Kansas City for Construction and Maintenance Work

Aluminum Paint Used on Car Exterior

ALTHOUGH aluminum paint has been used for many years where it is protected from the elements, its application to outdoor service is of comparatively recent origin. During the early part of August the Pittsburgh Railways, Pittsburgh, Pa., placed in service on its Crosstown route a car painted in this manner.

Aluminum powder, the base of the paint, is made by stamping sheet aluminum into very fine and small flakes, the process being originated by the Aluminum Company of America. These flakes are carefully sized by a series of sieves to give a uniform product, and where a high luster is desired a special polishing process is then employed. When the powder, which is mixed with varnish, is applied these flakes form a continuous film of metallic aluminum, arranging themselves layer upon layer much like fish scales and giving the effect of leafing. As this layer of aluminum scale prevents water reaching the metal underneath, the car is well protected from the elements.

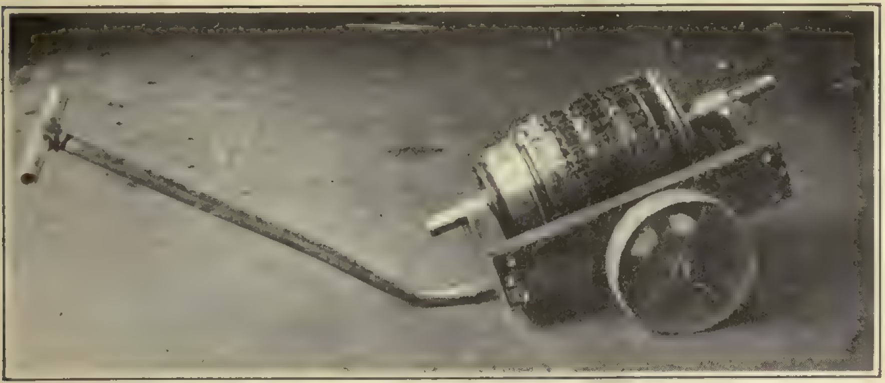
It is thought that cars given an exterior finish of aluminum paint will be cooler in summer than other cars, as the bright color will reflect the rays of the sun. A temperature test is being made on the car.

Air and Water Nozzle Cleans Trucks Before Painting

A PIECE of pipe about 4 ft. long to which are connected water and air hose with control valves, as shown in the accompanying illustration, has been found by the Department of Street Railways, city of Detroit, to make an efficient device for cleaning truck frames and parts preparatory to painting. Air is admitted at high pressure and the nozzle is held comparatively close to the part to be cleared. Dirt, sand, loose scale or other accumulated material are blown off readily and the truck parts are quickly put into condition for painting. This method has been found very much faster than the older method of using brushes or brooms for cleaning the truck side frame and parts.

Cleaning Trucks at Detroit by Air and Water Nozzle

A material advantage is obtained by the combination of water with the air. The parts are more thoroughly cleaned and the water tends to prevent the dust and dirt blown off by the compressed air from rising into the atmosphere of the paint shop.



Small Carriage for Transporting Compressor Armatures in the Decatur Shops of the Illinois Traction System

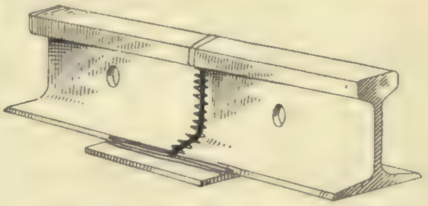
Small Carriage for Compressor Armatures

TRANSPORTING the air compressor armature from the pump room to the armature room at the Decatur shops of the Illinois Traction System is accomplished by the use of a two-wheeled carriage. Simplicity of construction is the outstanding feature of the wagon. A wood frame has 6-in. x 2-in. ends, 12 in. long, with the upper edges grooved out to receive the armature shaft. The sides are 4 in. x 2 in., long enough to extend over the ends, and allowing ample room between them to accommodate the armature. Counter-sunk screws hold the frame together.

The frame is mounted on an axle which has at each end a 10-in. iron wheel with 1½-in. tread. At the center of the axle is a tee connection to which the handle is fastened. This handle extends beyond the front of the frame and is there bent upward to a convenient height for a man to hold the short cross-member at its extremity. Pipe and pipe fittings are used in the construction of the metal framework.

Arc-Welded Joint Used Without Plates

A NOVEL method of repairing battered joints by arc welding without using plates has been tried by E. W. Jennison, engineer maintenance of way Bangor Railway & Electric Company, Bangor, Me. When it is decided to repair a joint in this way the paving is opened up and the old joint plates are removed. A small piece of steel, such as a tie plate, is then welded to the under side of the rail at the joint. By means of the electric arc weld the space between the rail ends is then filled up by zig-zagging the arc along the web of the rail, across the opening. This is carried up through the head of the rail where any depression is filled with welding metal. The joint is then ground down. No plates of any kind are used. The railway has found by experience that it takes about one hour to make a joint of this kind. Such joints are not considered superior to thermit welded joints, which are now extensively used by the Bangor Railway & Electric Company, but they are considered sufficiently good, and can be made more quickly and easily than thermit welds.



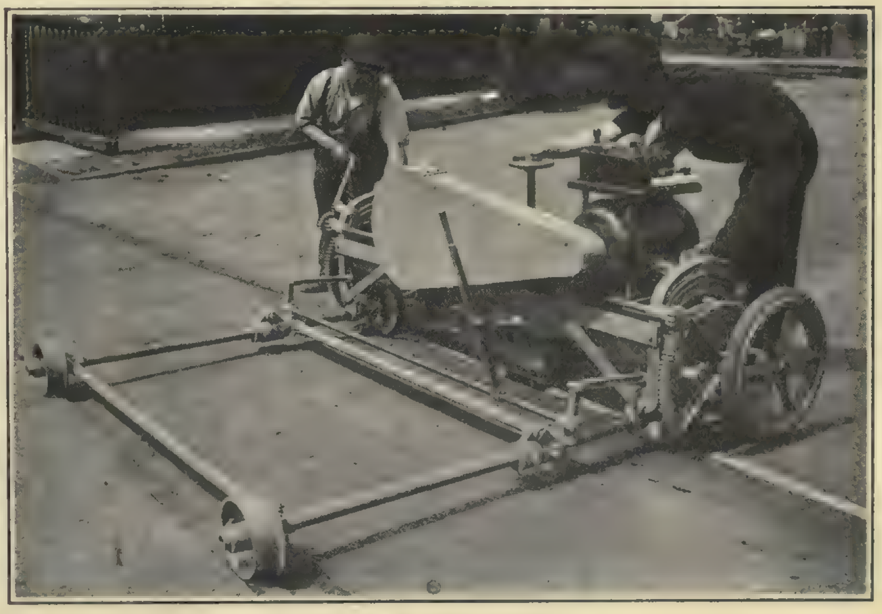
Rail Joint Made by Use of Arc Weld Without Plates

New Equipment Available

Reciprocating Rail Joint Grinder

A NEW rail joint grinder is being introduced by the Railway Track-work Company, Philadelphia, Pa. The new machine employs the reciprocating or planer method of grinding instead of using a rotating wheel. The abrasive is in the form of blocks 10 in. x 4 in. x 2½ in. with a steel pin inserted in one end. Two blocks are used in one setting of the machine, which provides a grinding surface 8½ in. x 2½ in. The blocks are placed endwise in the crosshead or holder which slides bodily in guides and is rubbed back and forth over the rail by means of a rocker arm movement. The normal speed of the machine is 340 strokes per minute. A constant-speed, 3-hp., 600-volt direct-current motor is used for driving the grinder.

As the abrasive blocks wear, the end wedge is slackened by turning a small handwheel over the wedge and the blocks are fed downward by means of a larger handwheel which operates the feed screws directly over the block. The machine may be derailed in order to allow cars to pass by turning the crankshaft at the right of the machine. This

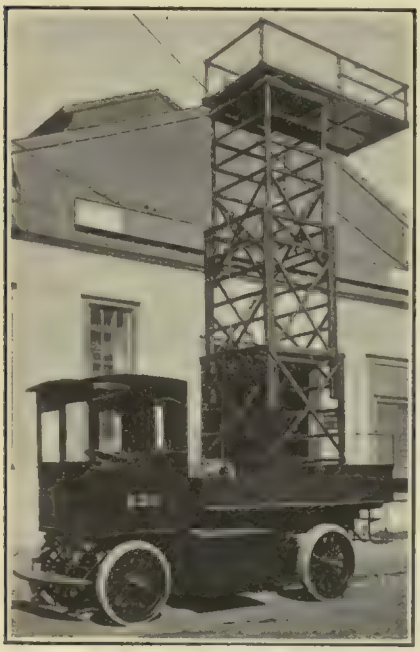


New Rail Joint Grinder

lowers the derailed wheel to the pavement and raises the grinder from the track. Ninety-five per cent of the weight of the machine is supported on the derail wheels. The outrigger is hinged so that it can be raised vertically. When this is raised, the machine can be readily pulled off the track.

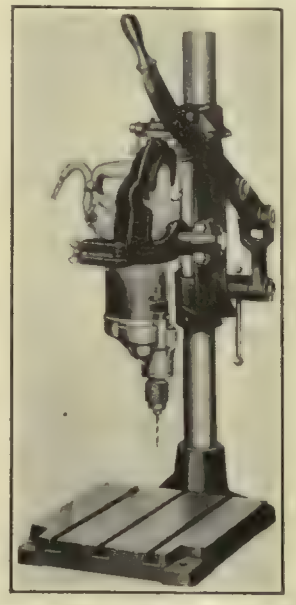
A Higher Tower Wagon for Painting Poles

A THREE-SECTION tower wagon with a height of 22 ft. from the ground to the platform has been designed and put on the market by J. R. McCardell & Company, Trenton, N. J. This height is several feet in excess of previous types of tower wagon made by this company. When the tower is collapsed, the over-all height of the vehicle is approximately 11 ft. 6 in. The tower is raised and lowered by means of a Sprague 1-ton electric hoist mounted directly behind the cab. The control of the hoist is from the driver's seat. This direct control combined with the unusual height of the tower makes the vehicle particularly well adapted for painting poles. In this work it is conveniently handled by two men, a driver and a painter on the platform. The tower can be raised by means of the electric hoist in approximately 30 seconds and lowered in less than 10 seconds. The design is such that it could be mounted on a gasoline-driven truck chassis as well as on the electric truck shown in the illustration. In that case the raising and lowering of the tower would be accomplished by a power take-off.


An Unusually High Tower Which Is Operated from the Driver's Seat Makes This Vehicle Well Adapted for Painting Poles

Bench Drill for Small Work

A SMALL-SIZE bench drill stand suitable for ¼-in. and $\frac{5}{16}$-in. hand drills has been added to the Hisey-Wolf Machine Company's line of bench drills. The small sizes of hand drills are held in position by using an adapter bracket. Without this bracket the drilling stand can be used with Hisey portable drills of ⅜-in., ½-in. and ⅝-in. capacity. This combination makes a portable sensitive drill press which can be operated from a lamp socket. The stand is fitted with an adjustable depth drilling stop which is a convenient feature when duplicating a considerable amount of work. The length of feed by lever is 4½ in. and the maximum distance from the top of the face to the drill chuck is 17 in. The net weight of the stand is 90 lb.


A Bench Drill Stand for Holding Electric Hand Drills

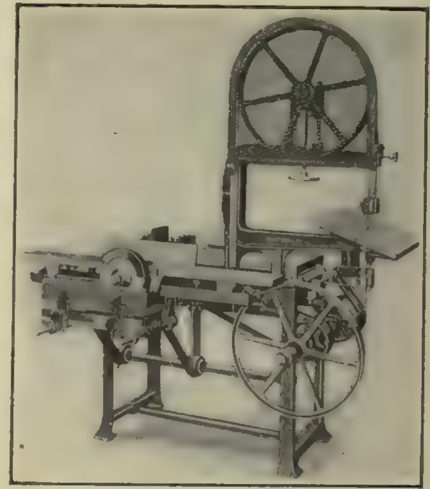
Improved Combination Woodworker

INCREASED planing capacity is a feature of the combination woodworker No. 2, manufactured by the Buffalo Forge Company, Buffalo, N. Y. This is the smallest of the woodworkers made by this company. The new planer head permits the planing of boards up to and including 8 in. wide, or 2 in. over the older design. The planer table is made in two parts, which fit into the channel on the main table and are adjustable on an inclined plane. One part of the table may be set at a lower level when planing to obtain the desired depth of cut. The planer guide used here consists of a hinged plate, ground to a high finish and locked with a single thumb nut. Any angle desired for beveling may be obtained with this guide arrangement.

The bandsaw on this machine is furnished with a cast-iron tilting table 17½ in. long and 14¼ in. wide. This table may be locked in position by means of a positive action cam and handle. The bandsaw wheels are turned and balanced. Slippage of the saw, and heat from the blade is reduced by an endless rubber band acting as a face cover.

The drive with this machine is of the pinion and gear pulley type. The gear ratio is approximately 2 to 1. The pulley pinion is cast in one piece, while the main shaft pinion is keyed to the shaft.

A feature of the machine is the handy belt shifter used. The driveshaft is 1 in. in diameter and runs in 4-in. babbitted and reamed bearings, split for adjustment. In addition the pulley for the jointer and the lower bandsaw wheel are also connected to this shaft by means of jaw clutches. This enables independent operation of each part, with resultant reduction in power and bearing wear.


This Motor-Driven Woodworker Combines Planer and Bandsaw

The driveshaft may be mounted to an electric motor or gas engine. The maximum power needed is about 1 to 2 hp. for the bandsaw and up to 3 hp. for the ripsaw, depending on the capacity and feed. The driveshaft should be run at about 700 r.p.m.

The News of the Industry

Important Boston Proposal

Metropolitan Planning Board Favors Rapid Transit Service Over Electrified Railroad Branches

In consultation with officials of the Boston Elevated Railway the Metropolitan Division of Planning, which is a State commission, has decided upon general outline plans for an extension of the rapid transit service out of Lechmere Square, Boston, to serve Somerville, North Cambridge, Arlington and the communities beyond on the northwestern side of Boston. Working details for the construction of such a rapid transit line will be developed by the commission, after which the proposition will be reported to the Legislature next January.

It is proposed to build a new roadbed out from Lechmere Square, parallel to the Boston & Maine Railroad for a short distance, and then cross over to the Lexington branch of the Boston & Maine and to take over that branch for a high-speed trolley service. It is understood that both the Elevated, which would have to operate the new service, and the Boston & Maine, which would have to give up one of its smaller branches, are favorably disposed toward the proposition.

The Planning Division, which advances the plan, was created by the Legislature of 1923. Some new specific duties were turned over to it by the Legislature of 1924, and its report to the Legislature of 1925 will be in the nature of official expert advice. The route which it is now suggesting is in line with the tendency for rapid transit development through Somerville and Cambridge and Arlington. The whole matter has a fair assurance of receiving favorable consideration from the Legislature. If the plan is adopted the service over the new line will be operated by the Boston Elevated. A large expenditure of money will have to be made in order to carry out the work. Some private land will have to be taken, several miles of new track will have to be laid, and the Lexington branch of the Boston & Maine will have to be electrified. Further details are not yet available for publication.

Helping Trainmen Understand Meaning of Service

In its untiring effort to serve its patrons and employees the Pittsburgh Railways, Pittsburgh, Pa., through its commercial department recently prepared in poster style some words of wisdom which if digested by the trainmen will result in more efficient operators and a more satisfied public. The company asks the trainmen if there is anything that should be said to the Police Department which may prove helpful to the trainmen and the policemen. It reads as follows:

> A friendly policeman ranks among the best assets a trainman can have. Cooperate with the police in making their work easier, especially at street intersections where traffic is heavy.
>
> Is there anything that we should say to the Police Department that may prove helpful to you and to them?

Another poster, entitled "Information," reads thus:

> Many passengers on your cars are strangers or residents of the city who ride infrequently and require information of various kinds.
>
> Try to be familiar with locations of streets, transfer points, parks, buildings, how to reach certain points by the cars, route designation of cars and other facts so they may be given in detail.
>
> The correct method of calling the names of all streets where stops are made is a great help to passengers.
>
> How may we help you to help the passenger who pays our wages, and in fact all expenses?

Denies Bus Permit Because of Railroad Facilities

The Public Service Commission of New York State gave consideration to existing railroad facilities and denied the application of Charles L. Wagner of Fonda, N. Y., for a certificate for the operation of a bus line between Amsterdam and Fonda and between Fonda and Fultonville. Mr. Wagner proposed to operate four trips a day and to charge passengers 50 cents a ride between Amsterdam and Fonda, a distance of 10.5 miles via the New York Central Railroad.

Evidence by the New York Central Railroad showed that there are nine passenger trains a day between Amsterdam and Fonda and six trains east from Fonda. There were 46,640 passengers so carried for the year ended March 1 last. The railroad showed that it operated trolley cars between Amsterdam and Fort Johnson and Tribes Hill, thence north to Sulphur Springs, where passengers can transfer to the trolley cars from Johnstown and Gloversville and go to Fonda. The trolley line fare between Amsterdam and Fonda is 48 cents.

The commission said it was true it might serve the convenience of some to have extra transportation between Fonda and Amsterdam, but considering the size of the places to be served, a schedule of nine trains in one direction and six in another would seem to be ample. The commission stated further that between Fonda and Fultonville there was necessity for some means of public transportation, but the applicant did not believe this route could be run profitably unless the line was extended to Amsterdam. Fonda and Amsterdam have two means of travel at the present time, and until a greater demand arises, the commission said, there was no public convenience to be served by the operation of the bus route.

Wage Matter in Court

Cleveland Controversy to Come Up Sept. 8 for Formal Hearing—Past Proceedings Scored

Depositions are now being taken in the court action brought by the union at Cleveland in an effort to compel the Cleveland Railway to pay a wage increase of 12 cents an hour awarded last May by an arbitration board from which the company had withdrawn its representatives. The suit itself is to be heard in court on Sept. 8. This action seeks to compel specific performance in accord with the findings of the arbitration board.

William Rea, secretary of the union, testified in his deposition that he had written a letter indorsing James W. Holcomb, the fifth and neutral member of the arbitration board, for the position of U. S. Customs Collector in Cleveland. This letter was written to Senator F. B. Willis under date of May 19, shortly after Mr. Holcomb was selected to be the fifth arbitrator. It was because John J. Stanley, president of the Cleveland Railway, contended that Mr. Holcomb was prejudiced in favor of the men that the railway company withdrew from the arbitration proceedings.

Mr. Rea testified that Mr. Holcomb had asked him to assist in securing labor indorsement of Mr. Holcomb's candidacy for the federal position as early as last January. John G. Owens, secretary of the Cleveland Federation of Labor, also wrote a letter indorsing Mr. Holcomb for the Customs Collectorship.

The Cleveland Railway contends that the letters of Messrs. Owens and Rea prove that Mr. Holcomb was prejudiced in favor of the car men's union.

Mr. Stanley, in his deposition, testified that he had been "framed" and "double-crossed" in the arbitration and it was for that reason he withdrew. He also said that two men purporting to come from Mr. Holcomb had approached him and asked him to tell them "what the company expected in the arbitration." He said he informed these two men that that wasn't the company's way of doing business.

Mr. Holcomb sent a bill to the Cleveland Railway for $1,250 as the company's half of his fee for acting as arbitrator, but the company has ignored the bill and invited Mr. Holcomb to sue to get it.

In Mr. Rea's letter to Senator Willis he makes the statement that Division 268 of the Amalgamated Association in Cleveland, representing 3,200 men, favored Mr. Holcomb for Customs Collector. In his testimony, however, Mr. Rea said that he hadn't discussed with the union executive committee or the union membership the indorsement of Mr. Holcomb.

Court Against Jitney Operators in Dover, N. J.

The Supreme Court of New Jersey recently sustained Judge Daly in the Morris Circuit Court in directing a nonsuit in the actions brought by Michael J. Kelly and Arthur J. Seldney, operators of buses between Morristown and Wharton, against the Morris County Traction Company and the officials of Dover, N. J.

The complaint in the case charged that the defendants carried on a campaign of libel, and conspiracy to destroy the plaintiffs' jitney business. It was also charged by the plaintiffs that the traction company and Otto G. Schultz, its treasurer, instituted several suits against them and sent a libelous communication concerning them to the Mayor and Board of Aldermen of Morristown.

The traction company, the court contended, owed to its stockholders the duty of affording them all legal protection against unjust or unlawful competition. It was therefore legitimate for it to apply to the court for any restraint upon the plaintiffs that seemed capable of affording protection in this respect.

The court ruled that there was nothing to show that the municipal authorities, in adopting the ordinances, or in the attempts to enforce them, were actuated by other than honest purpose to perform a public duty, and that a car line was only a means whereby the community could be transported from one point to another with convenience. The public was interested to see that this transportation was efficient, responsible and supplied at the lowest cost. Further, that a diversion of travel to other means naturally contracted the public patronage of the traction company and made probable added costs, in the way of higher fares to those who patronized its lines.

The court said that the public authorities were interested in the protection of the highways themselves against unreasonable use. Whether the ordinances were valid or invalid was of no consequence unless it appeared that the authorities were actuated by improper motives in their adoption and attempted enforcement. The court ruled that their actions were based upon an honest effort to preserve the public rights.

Railway in Competition for Michigan Bus Permits

The right of steam and electric railways to operate bus lines as common carriers is to be decided by the Michigan Public Utilities Commission. The question has been raised by the Northern Transit Company, which operates common carrier bus lines that connect Bay City, Saginaw and Flint.

The Northern Transit Company's state permit to operate buses expired on June 23 and it has applied for a new permit. The Michigan Railroad, an electric line, applied for a similar motor bus permit. The transit company contends the articles of incorporation for steam and electric roads provide that they are organized only to run steam and electric lines and if these articles do not specifically mention bus lines the electric railways should not be allowed to operate the latest form of transportation.

Railway's Tribute to Mr. Davis Is Fine Service—Candidate Acknowledges It

It is nothing uncommon for the great railway systems to be called upon to transport Presidential candidates, but the privilege falls seldom to an electric line. For this reason the honor of conveying the Democratic nominee, John W. Davis, from Clarksburg to Fairmont, W. Va., for a reception which was to precede his notification proved an important event for the employees and officials of the Monongahela-West Penn Public Service Company, which operates interurban service between these West Virginia cities.

Democratic Presidential Candidate Transported by Trolley

The party numbered 60, including the candidate, his family, guests from his home town of Clarksburg, and representatives of daily papers. They were provided a car on the special, which was appropriately decorated for the occasion, as was the terminal at Clarksburg and the stations en route to Fairmont.

May stops were made to allow the candidate to leave the train and greet the people of the Upper Monongahela Valley who grew up with him. On one occasion the train was held while Mr. Davis made a short address.

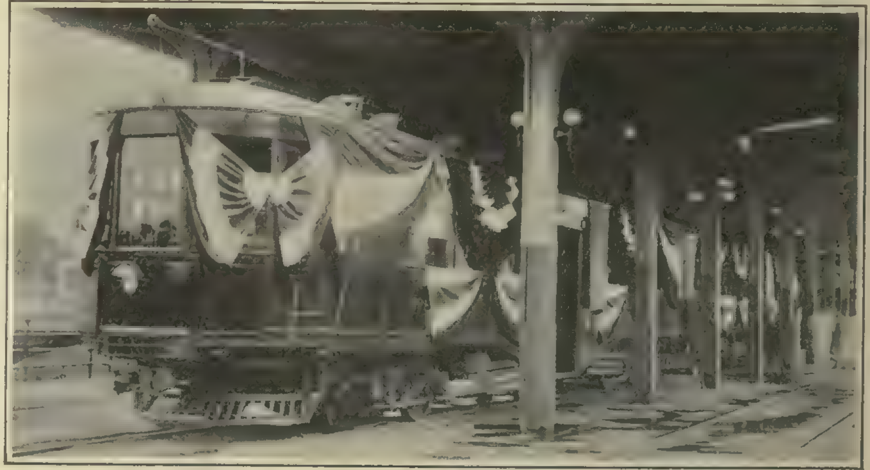
After spending three hours with his friends in Fairmont, Mr. Davis and his party returned home on his special, after complimenting the officials of the company for the splendid transportation they had provided his friends and himself.

Kansas City Railways Makes New Moves

The prospect of bus service in Kansas City, Mo., and in Kansas City, Kan., has precipitated action on the part of the railways of both cities. It will be recalled that the Federal Court at Kansas City pointed out that if buses are to be run, possibly the railways could best render that service. Fred W. Fleming, one of the receivers of the Kansas City Railways, concurs in the opinion that the railway should furnish bus service if the public desires such service.

In this connection it is of interest to note that an ordinance has been introduced before the City Council of Kansas City, Mo., through which the Kansas City Motor Transit Company, with Frank J. Dean, president, seeks a twenty-five-year bus franchise to operate about ninety buses over eight proposed routes. Mr. Dean is also president of the Yellow Taxicab Company, Kansas City. The City Council appears to be inclined to give opportunity for general discussion of the proposed ordinance, with every chance for the railway to put in bus service, if it desires to do so.

As to Kansas City, Kan., the railway has filed a petition before the Federal Court, asking permission to curtail service unless the City Commission retain the present anti-bus ordinance. This petition will be the basis of


Train and Terminal Decorated in Honor of Candidate

a hearing before Judge Stone on Aug. 30. The receivers had formerly agreed that new lines would be run as desired, if the commissioners retained the present anti-jitney ordinance. Members of the Chamber of Commerce and various civic organizations are urging the City Commissioners to meet the railway's request, in order to retain adequate service for the city.

Places of Subways and Buses Realized by St. Louis Interests

Stanley Clarke, counsel for the reorganization committee of the United Railways, St. Louis, Mo., speaking for J. K. Newman, active member of the committee, stated that he was favorably disposed toward the development of rapid transit for St. Louis through the building of a subway, as has been proposed by Mayor Henry W. Kiel and Charles E. Smith, consulting engineer for the city.

Mr. Newman announced that the reorganization committee would cooperate with the city in working out the subway plans and assist in the necessary preliminary studies, surveys and plans, etc. He holds that the public is entitled to the best service possible and feasible and that far-reaching plans for future developments should be worked out now.

In touching on the matter of bus service Mr. Newman stated that after careful investigation in the principal cities of the country in which such service has been installed the reorganization committee believes that at least for a long period from 85 to 90 per cent of the riding public will continue to depend on trolley cars for transportation. Mr. Newman and his associates feel, however, that the bus has an important place in the transportation system of a city.

The recently-organized St. Louis Bus Company will operate in co-operation with the United Railways under a reciprocal transfer arrangement, and all profits of the bus lines after a reasonable return on tho investment will be turned over to the railway.

Motor Vehicle Legislation Up for Consideration in Rochester

Assemblyman Lewis G. Stapley of Livingston County has been chosen chairman and Senator George R. Fearon of Syracuse vice-chairman of the special legislative committee created by the New York State Legislature last winter to propose legislation to strengthen the motor vehicle law. Mark Graves of the State Tax Commission addressed the committee and suggested that it take up an investigation of the inconsistencies in the present law that the committee thoroughly go into the proposition of compulsory insurance for all drivers of cars and that the feasibility and practicability of a gasoline tax receive consideration.

Other subjects to be considered by the committee will be a uniform motor vehicle law for all states and a uniform traffic ordinance for all cities of the state. The subject of headlights will also be taken up and it is quite likely that the committee will recommend the age limit at which an operator may receive a license to drive a car be reduced from 18 to 16 years, on account of the protest this provision of the law is creating among rural residents.

The committee will hold its first public hearing at Rochester shortly where it has accepted the invitation of the Rochester Automobile Club and will hold hearings throughout the state with the idea of getting the ideas of drivers of cars and officials of motor vehicle organizations.

Wants Lower Fare

The City Council of Montreal, Canada, has been petitioned recently by the Trades and Labor Council, asking the co-operation of the Alderman for the purpose of getting a reduction in fares on the Montreal Tramway System. The resolution declared that the price of tickets had been increased during the past few years, including the abolition of working men's tickets, and though the receipts of the company had considerably increased yet the company had made a reduction in the wages of its employees. Further, it was charged the company enjoys a monopoly of the streets of Montreal, and should supply the citizens with a transportation service as cheaply as possible. The petition said that the fares should be revised to the former tariff of six tickets for 25 cents, and eight laborer's tickets for the same price. In a letter following the resolution the Montreal Tramways Commission referred to the higher wages of the employees and the annual rental of $500,000 to be paid the city.

City Service Extended to Broad Ripple

The Public Service Commission has approved a contract between the Union Traction Company of Indiana and the Indianapolis Street Railway whereby the railway uses the Union Traction Company's tracks from Forty-sixth Street to Broad Ripple Park, extending city service as ordered several months ago by the commission. The lease is for one year and thereafter until ended upon six months' notice by either party. Rental is to be 7 per cent annually upon $85,478, fair value of Union Traction Company's track as appraised by the engineers of both parties. Service is scheduled to begin Aug. 31, when the Union Traction Company will discontinue its service and turn over the Broad Ripple cars, to be used until the railway supplies its own cars. The lease gives Broad Ripple city fares as 7 cents and four tickets for 25 cents. Heretofore the fare to Broad Ripple has been 10 cents. The railway, under the contract, will maintain the track over which the Union Traction will continue to run interurban cars. The railway will do any reconstruction necessary and pay taxes on the property. The conditions under which the commission increased fares in Indianapolis made it obligatory that the Broad Ripple service be started by Sept. 1.

Opposes Bus Speed in Chicago

Chicago's recently waged warfare against speeding vehicles is now entering the stage where different types of vehicles are coming in for criticism from the drivers of other vehicles who feel that thus far they have been shouldering the brunt of the drive against speeders. A "John Doe" warrant directed against the Chicago Motor Coach company, charging speeding, was issued recently by Judge George B. Holmes, at the instance of Attorney James T. Moore, a member of the legal department of the Illinois Automobile Club.

The object of the warrant, according to Mr. Moore, is to test the enforcement of the speed limits of the buses. While automobilists are confined to a rate of 15 m.p.h., Mr. Moore says, buses are permitted to operate at the rate of 20 and 23 m.p.h. The clause which the motor club will seek to have enforced makes it mandatory that a bus that has hard rubber tires shall not travel more than 12 m.p.h.

It's the Tenant that Pays in New York

Stewart Browne, president of the United Real Estate Owners' Association, New York, takes issue with a recent expression by Arthur S. Somers, president of the Brooklyn Chamber of Commerce and a public director of the Brooklyn-Manhattan Transit Corporation, on the need of increased fares in New York City. Mr. Browne says that an article by Mr. Somers printed in many of the local papers was nothing less than an appeal for an increased fare on the subways. Mr. Browne says he is not prepared to say whether or not an increase in fare is necessary, but he thinks Mr. Somers' comments are fallacious although they are made from an entirely new standpoint. Mr. Browne says:

> The $10,000,000 dual subway deficit. which is included in the city's tax levy. is more than paid for in increased taxes received by the city from increased realty assessed valuations, created solely by the subways. To deny this is splitting hairs.
>
> New subways could be built in Manhattan by local assessment on property benefited and the income from such increased values would more than pay the debt service on the local assessment bonds issued for construction.
>
> In Richmond and Queens subways could not be built by local assessment, but could be built by local assessment plus city bonds, and while the increased taxable values would not equal the debt service for the first ten years, subsequently they would. The present dual subway deficiency should not be used as an argument for future deficiencies. because the deficit is largely caused by the "contract differential."
>
> Mr. Somers says it is the tenant and not the realty owner who pays the "tax levy" $10,000,000 subway deficiency. He can't prove this. Suppose the tenant does pay. Why shouldn't he? The subways are built for him. He is chiefly benefited. His earning power is higher. His rent is lower.
>
> Mr. Somers says that non-city residents coming to New York use the subways and don't pay their share of such subway deficit. Visitors pay more than city residents, because they spend more per capita per day and are "short haul." Workers within the city, but living without, may pay less per capita. But what of that? They are part and parcel of the city and are necessary.
>
> Rapid transit at a low fare is necessary for the growth of New York. It is the growth of the Bronx, Brooklyn and Queens that has built up Manhattan's business and realty values. New York City couldn't be what it is without Long Island, New Jersey and "up-State" and all of the States. They all help its growth.

Railway Makes Bus Bid

New York Line Asks that Fifth Avenue Company's Plea Be Put Over Pending Its Own Application

The Third Avenue Railway, New York, has entered the competition for franchises to run bus lines. S. W. Huff, president of the company, on Aug. 22 sent to Mayor Hylan a letter requesting that no action be taken by the Board of Estimate on the application of the Fifth Avenue Coach Company for bus franchises until the plan of the Third Avenue had received consideration. Mr. Huff said his plan would be ready soon. He made known that his company contemplated establishing routes in many instances along the lines proposed by the Fifth Avenue Coach Company in the latter corporation's plan to establish thirty-four lines, 116 miles in all. Though the Fifth Avenue Coach Company proposes to operate in Manhattan, the Bronx and Queens, practically gridironing Manhattan, the Third Avenue plans to place the majority of its bus lines in the Bronx, entering Manhattan in only a few instances.

In presenting his application for consideration Mr. Huff said:

> I notice that you have before you an application from the Fifth Avenue Coach Company for franchises to operate buses in various sections of the city. A number of these lines not only parallel lines of the Third Avenue Railway system but in many cases actually operate throughout the greater part of their length upon identically the same streets. Such paralleling can only mean adding to the already congested condition of the streets and also render the service on both the trolley cars and buses less efficient than if the bus operation were in territory not now conveniently served.
>
> The Third Avenue Railway is at the present time operating approximately 300 miles of trackage in the territory sought to be covered by the Fifth Avenue Coach Company, is handling about 1,000,000 passengers a day and already has as many employees as the Fifth Avenue Coach Company estimates it will have if it is permitted to spread its operation over the city.
>
> The companies of the Third Avenue Railway system paid the City of New York in taxes and paving charges (exclusive of taxes paid to the State of New York) $1,413,000 during the year 1923, and will pay approximately that amount during the year 1924. It is furnishing in the Bronx the transportation for which you have so earnestly contended, namely, a 5-cent fare and universal free transfers, and, I may say, it is the only company that has covered an entire borough with a 5-cent fare and a universal free transfer. The Bronx is the only borough that enjoys this low fare.
>
> Although we may not agree with you fully as to the desirability of bus operation, we recognize that there is a field for such operation as feeders both to trolley lines and subways.
>
> As you probably know, we have been for some time working on a plan for co-ordinating bus operation with our 350 miles of street car operation. The plan is being worked out for the various communities that we are seeking to serve with transportation in co-operation with people who should be best acquainted with the needs of those communities.
>
> We believe that the best interests of these communities will be served and the best solution of their transportation problems will be offered by extending this bus operation into territory not at the present time conveniently served with transportation rather than to congest streets with both trolley and bus operation, and we propose to co-ordinate the bus system with the trolley system by free transfers from the buses to the trolleys. This will utilize to the best advantage the surface car transportation now in existence, which is carrying over 40 per cent of all passengers carried on transportation lines in the greater city.
>
> The system of bus operation that we are evolving finds its largest development in the Bronx, and will not be confined to communities already provided with transportation, but will serve all sections of the Bronx. We hope to have this plan ready for submission to the Board of Estimate and Apportionment at a very early date, and I am writing to ask that no action be taken in the matter of granting franchises for a general bus system until our plan has received consideration.

To have given these applications consideration at the special meeting of the board on Aug. 22 would have required unanimous consent. This was made impossible when the Mayor moved that all bus applications pending be referred to the committee of the whole, the franchise committee and the Board of Transportation, these bodies to report back to the Board of Estimate. At the same time the Mayor made known that his motion referring applications to committees included also the applications of the B.-M. T. and the Queens concern. Borough President Connolly of Queens suggested that other applications might be entered and asked that all such applications also be referred to the committees. This motion was adopted.

Railway Service in Sections of Morgantown Threatened

The Union Traction Company may suspend operations on its lines in the First and Second Wards of Morgantown, W. Va., as a result of a controversy with the city over street improvements.

City Manager Harry Bayles conferred informally with James McGrew, secretary of the railway, and was told that an investment of approximately $50,000 would be necessary to improve the streets within the company's lines and that the business through the territory mentioned would not warrant the continuance of service.

A 30-day notice as provided by statute was served on the company by the city during the latter part of July to improve the lines. In the event of no action in that period it is likely that the city will revoke the franchise, tear up the tracks, proceed with the improvement of Simpson Street and other streets and the Union Traction Company will cease as a public service agency so far as the city is concerned.

Disagreement on Franchise Provisions in Sioux City

Disagreement over the provisions of the twenty-five-year franchise for the Sioux City Service Company, Sioux City, Iowa, may result in the special franchise election being postponed until sometime in September. Mayor Stewart Gilman states that five or six matters are not covered by the franchise which should be included. He referred to the question of the 2 per cent tax on the gross earnings when the city has reached a population of 75,000. Second, there is the provision for extensions.

There is also a question, the Mayor said, as to how soon the city could take over the property of the company in case of failure to carry out the provisions of the franchise. The Mayor said that he thought a reading of the analysis of the franchise as made by him ought to inform the voter so that he could cast his ballot intelligently.

Increased Fare Suspended

Ten-Cent Fare on Springfield Street Railway Lines Deferred Until Further Study Is Made

The Massachusetts Department of Public Utilities recently suspended until Sept. 7 the operation of the new fare schedule which the Springfield Street Railway planned to put into effect on Aug. 24. Representatives of the company and of civic bodies which are opposing the proposed increase to 10 cents cash with three tickets for 25 cents from the 7-cent rate will appear before the commission at the State House on Sept. 3, to present arguments on the evidence placed before the department at the hearing in Springfield and at Boston. The session on Aug. 20 was devoted to the presentation of figures by Vice-President Howard R. Whitney and by Prof. Albert Richey of the Worcester Polytechnic Institute. Both were cross-examined by Attorney Raymond T. King, representing the federated civic bodies.

Bentley W. Warren, counsel for the company, offered a statement of the earnings for June, in which the financial results were segregated by lines. This statement indicated also those lines the receipts of which were less per car mile than the average operating expenses of the company.

Mr. Whitney was asked whether it might not be more profitable for the company to replace its local lines with buses. He replied in the negative, pointing out that while one bus may be operated at less cost than one trolley, nevertheless rush hour requirements would demand at least three buses, two of which would remain idle all day.

Professor Richey said he had made a computation of the company's receipts, if the suggested 8-cent fare had been in operation during the year 1923. Under the schedule he said that the passenger revenue, based on the 1923 business, would have been $3,524,800, or $273,564 more than the company actually collected. This figure, he contended, would be entirely inadequate, as the company's estimate is that its revenue must be increased $501,000 over its probable receipts this year.

Attorney Richard J. Talbot, counsel for the Busmen's Association, urged the adoption of the service-at-cost plan. He offered the suggestion that the commission request the railway to give up its non-paying bus lines and leave this development to independent operators with small, fast buses, and that the railway's petition for an increase in fares be continued until the directors of the company considered the plan provided for by the laws of the commonwealth, under which it is permitted to charge as part of the operating cost a 6 per cent dividend on the common stock and fix fares accordingly.

Commissioner Ellis asked if an 8-cent fare would take care of the company's expenses, including the increase in pay for the men, if riding had not fallen off. Professor Richey thought that this would be true, but that sight must not be lost of the further factor that the company must make up about six months' back pay for its employees.

Animated Correspondence

Traction Man Enlivens Life for New Yorkers by Crossing Pens with Mayor Hylan

Not since the late Frederick W. Whitridge as receiver of the Third Avenue Railway, New York, crossed pens with the Public Service Commission in the early days of commission rule have the readers of the New York dailies been treated to correspondence regarding transit matters so piquant as that which it now enjoys. The principal contestants in the race for letter writing honors are G. M. Dahl, the chairman of the Brooklyn-Manhattan Transit Corporation, and Mayor John F. Hylan.

SEVEN YEARS OF DELAY

While they are drinking their morning coffee, urbanites may chuckle over the Mayor's statement that he is in receipt of Mr. Dahl's "screed of even date," but that is nothing to the smile which is likely to spread over their faces when Mr. Dahl reminds them at the outset of his reply to the Mayor that "at last after seven years of delay we learn by today's newspapers that your Board of Transportation is actually to get busy (on subways) by advertising for bids," etc. Mr. Dahl congratulates the Mayor on signs of activity on the Mayor's part toward subway construction. It is not in the evidence yet that the Mayor has congratulated Mr. Dahl on his activity.

Seven years of delay. Think of it! Apparently the public does. Mr. Dahl takes care of that, but he is comparatively new to traction circles in New York, while the Mayor is practiced in the art of making faces. He has made faces before at the traction triplets, as the Mayor himself in an alliterative moment once put it in referring to certain local railway managements. The late but learned Mayor Gaynor used to refer to Epictetus and send people to the dictionary to learn the meaning of unusual words which he employed, but Mayor Hylan never forgets himself. Common language, very common language at times, is good enough for him. Listen to this: "This fellow Jerry Dahl is in for the fight of his life. You can tell the people for me that my block is safe, but Dahl's is not. We'll put this fellow Dahl in his place." Even this is a mild outburst.

CHASING RAINBOWS

The Mayor still sees red, however. He accepts full responsibility, for instance, "for checking the rapacious schemes of the B.-M. T., which Mr. Dahl tries to color with the hues of the rainbow at the expense of the people." Rainbow chasers always see red. It is one of the primary colors of the solar spectrum. To the Mayor the most recent rainbow was the Governorship. It peeves the Mayor to see Mr. Dahl using full page space in the dailies "falsely presenting actual conditions" and breaking into print "at the expense of the people." The Mayor's people, of course; not Mr. Dahl's. To the Mayor Mr. Dahl "is easily the most conspicuous disciple of brazen effrontery." So the Mayor advises City Transit Commissioner Delaney to ignore attacks of Mr. Dahl and others who seek speedy action on proposed subway projects. As for Mr. Delaney, he "is in his workroom, too busy on subway plans to dignify the attack with any response. He has indicated that he does not intend to make a reply."

The advertisement in question, it should be explained, contrasted the attitude of John H. Delaney as Transit Construction Commissioner under Governor Smith in 1920 with that of Mr. Delaney, now chairman of the Board of Transportation of the City, appointed to that office on Jan. 1, 1924, by the Mayor. "Which will it be, Delaney and Dig or Delaney and Delay?" asks Mr. Dahl in a smash advertisement of a whole page emboldened by big type, a map that anybody could understand and not too much type and that easily readable. In conclusion Mr. Dahl says boldly over his own name:

"Delaney and dig is a real constructive policy. Support it!

"Delaney and delay is a Hylan policy. Defeat it!"

As previously indicated, the Mayor has said that he assumes full responsibility. If Mr. Dahl shirks responsibility there has been no recent outward evidence of it. The courage isn't all one side. No, indeed! For instance, if further proof were needed Mr. Dahl announces that he will put some of his ten new buses in free operation over routes in territory now sorely in need of transportation service. And he did it. He did it last Tuesday. It was a day of violent storm.

SAMPLE BUS SERVICE RUNS FREE

It is "a sample service so as to let the people see our buses and form their own judgment, independent of the Mayor, as to whether they like the buses." At the end of the week the buses will be run in free service over other routes. This will afford a study in contrasts between the Mayor's buses and Mr. Dahl's, but Mr. Dahl isn't worried about that. Mark you, the service is all free. The company has applied for the right to run buses on three routes, and it has stated that it is ready to lay out a comprehensive system of routes supplemental to its existing transit and surface system.

As soon as the Mayor heard about the experimental system he wrote another letter. It was addressed to Police Commissioner Enright. Sometimes the wish is father to the thought. The B.-M. T. didn't intend to operate over routes on which others are running, but the Mayor didn't wait to find that out. To Commissioner Enright he said: "Any attempt by the B.-M. T., under cover of a so-called free bus system, to drive out of business little, independent bus operators on routes laid out and approved by the city should be stopped at once by summary police action." Mind you, it is the same man speaking who is working for municipal rapid transit and who has a $25,000,000 municipal bus plan of his own to compete with existing lines. Naturally Mr. Dahl is "glad to have the Mayor supporting so strenuously the principle that duplication of transit service should not only be avoided but should be prohibited, and that the support of the courts should be invoked to prevent that duplication of service. That principle applies, of course, not only to bus service but to surface line and rapid transit service. We congratulate Mayor Hylan on taking such a sound stand, and we hope he will adhere to it in the future."

A bus, of course, is a very elusive thing. No definite instructions were given by the Mayor to the commissioner as to how to proceed, except to take "summary police action." In times past many culprits have successfully eluded the New York City police, but as the local force boasts a number of ex-cowboys practiced in roping steers, the first thought of the Mayor may have been for them to lasso a bus by the front wheels as it dashed over the city's neglected pavements, intent upon escaping to the nearest garage and hiding itself away. So far New Yorkers have been spared the sight of a pair of the Dolly Sisters, as the police are known who ride around day and night in Fords supplied by the department, rope in hand, careening through the streets in hot pursuit of a fugitive bus. The first attempt to catch a bus turned out differently. A mounted cop in the suburbs ambushed two of the vehicles said to be operating in contravention of the competitive part of the Mayor's order and served two drivers with summonses to appear in court in Jamaica. The time was 9 p.m. There has been no need for the Mayor to carry out his threat "to stop them running even if it takes every cop in the city."

Incidentally it might be mentioned that the Mayor has charged that Mr. Dahl made a trip to French Lick in order to reach him. Just why Mr. Dahl should go to French Lick to reach the Mayor when he appears to be doing it so well right at home is not quite plain. An old axiom of prize fighters who desire to score a quick knockout is: "Get your man mad." Mr. Dahl has said publicly: "The Mayor is a bit excited." This isn't boasting on Mr. Dahl's part. The preponderance of evidence is all on his side. As the judge often explains to the jurors: "Reasonable doubt is the doubt of a reasonable man." The verdict of the public and the papers regarding the case, so far as the Mayor is concerned, is: "Guilty!" There can be no doubt about the reasonableness of that.

Agrees to Allow Deferment of Improvement

The Council of Sacramento, Cal., will allow the Central California Traction Company further time in which to relocate its tracks and pave between them on Stockton Boulevard.

In August, 1923, City Engineer Albert Givan notified the company to relocate its tracks and do the paving so that work could start on the improvement of Stockton Boulevard, one of the main entrances to the city. Officials of the railway declared it would be impossible to do the work at this time, because of financial difficulties, but they agreed to place the tracks in the center and to install temporary paving after Jan. 1.

News Notes

New Franchise Before Voters.—A new railway franchise for the Northern Ohio Traction & Light Company will be up for a vote at the election in Akron, Ohio, in November. Books of the company are now being audited to determine the basis upon which the new franchise will be written. This is in accordance with the terms of the agreement under which the car-bus dispute was settled, as noted in the ELECTRIC RAILWAY JOURNAL for March 1, p. 330.

Buses in Flint.—It is reported that the City Council of Flint, Mich., has ratified an agreement with the Detroit United Railway whereby it will be allowed to operate buses over streets in conjunction with its electric railway services. An ordinance provides that buses shall be in operation within 30 days. The fare is to be 10 cents, or four for a quarter, with free transfers to trolley lines.

Benefit Association Formed.—The employees and department heads of the Dallas Railway, Dallas, Tex., have formed an Employees' Mutual Benefit Association. Formerly, it was customary to take up collections to assist those who were in need, but under the proposed plan members will receive free medical and surgical attention; indemnity will be provided for time lost through sickness or accident and medicines will be furnished at cost. Under the insurance feature, each member will receive a $500 life insurance policy. Membership in the association will be voluntary, but fewer than forty eligible employees out of more than 800 indicated their unwillingness to become members.

More Transfer Privileges in Pittsburgh. — The Pittsburgh Railways, Pittsburgh, Pa., recently announced the granting of additional transfer privileges on virtually all divisions of the system. Practically every route in the city is affected by the schedule. The installation of the general transfer system, which gave Pittsburgh riders the advantage of riding from one end of the city to the other for 8⅓ cents, was referred to in the ELECTRIC RAILWAY JOURNAL, issue of July 5, 1924.

Operating Buses in Natick and Lexington. — The Middlesex & Boston Street Railway, Newtonville, Mass., has received its bus license in Natick and has put four buses in service in that section. In Lexington the company has also received a license to operate and six buses are to be utilized in this operation. Some of these are already running and men are being broken in to operate the remainder.

Railway Officers Fill Bus Positions.—The organization meeting of the newly incorporated Binghamton Auto Bus Lines, Inc., Binghamton, N. Y., was held on Aug. 19 and executives of the Binghamton Railway were elected to the bus company as follows: President, Frank L. Fuller; vice-president, R. W. Day, Scranton; treasurer, Elmer M. White; secretary, William H. Hecox; assistant secretary and assistant treasurer, H. I. Jackson. These men fill the same offices in the Binghamton Railway. The meeting adopted a resolution to establish a line of buses on the south side of Johnson City which will include Riverside Drive and Grand Avenue. The company intends to commence bus service on Sept. 1 with two Mack buses.

Wages Advanced.—A new wage scale will become effective Oct. 1, under which trainmen of the Dallas Railway, Dallas, Tex., in the first year of employment will receive 45 cents an hour. The wages for the second year will be 48 cents an hour and for the third year and thereafter 50 cents an hour. In each classification the operators of one-man cars will receive 4 cents an hour in addition to the regular wage. In the old scale provision was made for two classifications, first year employees who received 42 cents an hour and those in second and subsequent years who received 46 cents an hour. It also provided for 4 cents an hour additional to one-man car operators.

New Transfer System in Force.—The Jacksonville Traction Company, Jacksonville, Fla., started a new transfer system on Aug. 1. In the new transfers the necessity of the trainman punching destination and time on slips is eliminated. The name of the line from which the transfer is issued and the transfer points at which it is good for passage on another line are given at one end, while the time units are at the other. Transfers used during the morning hours will be good until noon. They will be of rose color. The evening transfers will be light blue. The date will be designated by a letter of the alphabet printed in bright red and changed every day. It is believed that considerable time will be saved both for the passenger and the trainmen in the use of the new system.

Will Try Weekly Pass.—The Hagerstown & Frederick Railway, Hagerstown, Md., will experiment with the unlimited weekly pass system at Frederick. If the pass proves successful the company plans to introduce it at other points on the line, including Hagerstown. The pass will be sold for 85 cents. The schedule was filed with the Public Service Commission for approval.

Fare Ordered Cut.—In accordance with complaints filed by the city of San Bernardino, the California Railroad Commission recently ordered fares on the Pacific Electric Railway, between San Bernardino and Colton reduced from 9 cents to 6 cents. Reference to the petition of the city and the conclusion of the hearing were made in ELECTRIC RAILWAY JOURNAL of Aug. 16, 1924.

Trying Out Lower Fare.—The Eastern Massachusetts Street Railway, Boston, Mass., is trying out on its Taunton division an experiment of twenty rides for $1 for a period of sixty days. The plan is to determine if lower fares will produce more revenue through inducing a greater volume of business.

Subway Actually Started.—Construction on the Broad Street subway, Philadelphia, Pa., was started on Aug. 25, when Mayor Kendrick took the pick and shovel and started the excavation. City officials, officials of the Philadelphia Rapid Transit Company, and many citizens were on hand to witness the first step in the $42,000,000 project which has been under consideration for practically nine years. The first expenditure on this high-speed system is $14,000,000 which is the contract price for the construction of the first section. The many incidents in the promulgating of this plan have been referred to before in the ELECTRIC RAILWAY JOURNAL.

Wages Lowered.—The Court of Industrial Relations of Kansas recently issued an order cutting the wages of employees of the Arkansas Valley Interurban Company, Wichita, Kan., 3 cents an hour. This is understood not to have been all that the company had hoped. After the employees and management had been unable to agree unon a wage schedule, the court was appealed to by officials of the company. The former wages for the trainmen ran from 40 to 50 cents an hour. In its opinion the court points out a plea of poor financial return by a corporation is not sufficient cause for the lowering of the wages of its employees to a point that would put them below a fair living wage.

Paving Suit Transferred to Federal Court.—The suit to compel the Seattle & Rainier Valley Railway, Seattle, Wash., to pave between its tracks on Dearborn Street and on Rainier Avenue inside the city limits has been transferred by Superior Judge Mitchell Gilliam to the federal court, despite the opposition of the four Rainier Valley residents who brought suit against the company. Walter M. Brown, manager of the traction company, has made an affidavit that the paving would cost the company about $1,000,000.

Bus Line Permit in Syracuse Granted.—The Public Service Commission granted a certificate on Aug. 26 to the Syracuse Railways Co-ordinated Bus Lines, Inc., to operate a bus line from East Genesee and Warren Streets, Syracuse, N. Y., through Warren, James and Shotwell Park, returning by way of James, State, North State and East Genesee Streets. The bus line is to be operated under the provisions contained in a license certificate granted by the city of Syracuse on Aug. 6. The fare will be 7 cents. Transfers are to be given to and from the trolley lines and the company is directed to file a liability bond as required by the State Commissioner of Motor Vehicles.

Line Sought From Manteca to Stockton.—The Chamber of Commerce of Manteca, Cal., is anxious to secure a line between Manteca and Stockton. That organization recently called upon officials of the Tidewater-Southern Railway to divulge the project to them. The Tidewater-Southern Railway operates a line of which only 2 miles are in paved streets. Their reply was that the operating expense of such a proposed railway, would be much greater than the warranted business.

Foreign News

L. C. C. Committee Favors Tramways

After a Review, Says Tramways Are Most Suitable for Street Passenger Transportation

Relative costs and efficiency of tramcars, trolley buses and petrol buses was the subject of a report recently presented to the highways committee of London County Council. The object was to determine whether or not it would be advisable to develop the County Council's tramway undertaking by means of railless electric cars and petrol buses instead of tramways.

The committee reported a loss on trolley bus operation in Bradford and Leeds, after interest and redemption of stock were met. Birmingham decided to install trackless cars in place of a single track tramway with loops running through narrow streets where it was impossible to widen the streets, although the city was already operating a fleet of buses.

The operating costs per car mile of the three systems were: Tramway, 14.824d (12 months); petrol buses, 15.407d (12 months); trolley buses, 12.648d (4 months). Included in the latter the figure of 1.209d per car mile for repairs and maintenance was very low as it covered the first four months of operation, when these costs are lowest. The corresponding figures for repairs and maintenance at Leeds were 5.150d per car-mile, and at Bradford, 4.534d per car-mile.

In the case of these three large cities, tramways appeared a better commercial proposition than trolley buses. With regard to earnings of tramways and buses in provincial towns there was little or no competition, so that it did not follow that tramways over routes covered by bus service would not have shown better results.

A. Baker, manager Birmingham Tramways, reported that it is expected that trolley buses will be used as extensions of existing tramways or in substitution for a single line tramway where traffic is light, particularly when faced with reconstruction. He expects to use petrol buses in suburban districts and for cross country routes. He emphasized that for the transport of large masses of people expeditiously and cheaply, the tramcar had no competitor and still held the field.

Manchester City Council recently arrived at the conclusion that no other vehicle was available that could supersede the tramcar in its essential merits.

A. L. C. Fell, manager London County Council Tramways, agreed generally with the results reached in Birmingham and Manchester. It was his conclusion, therefore, that the tramcar was the most suitable vehicle for street passenger transport both from the financial and utilitarian point of view.

The committee recommended to the Council consideration of the trolley or motor bus as extensions of existing tramway service where competition by other means of transport did not exist but stated that in its opinion there were not many cases of extensions by means of trolley bus that would provide as satisfactory results as extension of the tramways, except in cross connections where the length of route was sufficient to justify operation of an independent service of motor or trolley buses.

P.L.M. Develops Feeder System in Dauphiny

The Paris, Lyons & Mediterranean Railway was the first to see the possibility of working in conjunction with the "light railways" and motor bus lines. Today almost all of the mountain touring regions of Dauphiny and Savoy are to be reached by transfer either to the light railways or the motor bus services, which latter have this year grown to proportions unforseen when the services were first put into operation just before the war.

The bus system of this one railway alone covers routes of nearly 4,000 km. (2,480 miles), running not only from Nice on the Riviera to Lake Geneva (or more properly Lake Leman, as is its geographical name) but in the high valleys of the French Alps as well, in on instance crossing the second highest carriage road in Europe, that of the Galibier at an elevation above the sea of 2,658 m. (8,750 ft.). Other routes are found in the Jura mountains to the north, and the Eastern Railway of France has inaugurated a similar service between the French slopes of the Vosges and those of Alsace, superseding the famous electric railway over the Col de la Schlute at 1,150 m. (3,800 ft.) altitude.

Circular tickets are issued covering the railway, the light railway and the motor bus circuits. For the most part, in the high altitudes, these services stop the last of September.

Paris Suburbs to Have Direct Subway Service

Extension of Line No. 1 of the Metropolitan Underground Railway has been approved by the Paris Municipal Council. This extension will run eastward from Vincennes into the country, making use of the Chemin de Fer de Paris a Vernuil, which leaves the Place de la Bastille, where two Paris subways have stations, thence to Bonneuil on the banks of the Marne, a distance of about 8 miles beyond the gates of the city.

Another project in view is the linking of the Sceaux-Robinson steam line, on the left bank of the Marne, with suburban subway lines, which will give access to the southern suburbs.

Both projects are of considerable magnitude, but there should be little difficulty or delay in changing over as the rails and right of way already exist.

British Bus News Summarized

It has now been definitely resolved by Darlington Town Council to substitute the trackless trolley system for the town's existing tramway undertaking. Estimates presented showed that to renew the tramways would cost £100,000 while £60,000 more would be required for new cars. If, besides the renewal, projected extensions were carried out, the cost would be £200,000, plus £100,000 for new cars. The estimated cost of substituting the railless system, including cars, was £35,000, or with the projected extensions £60,000. It was stated that the adoption of petrol buses would cost about the same as the trackless car installation, but the Council would only obtain a seven-year loan for the petrol buses, while for the railless electric cars a loan period of 15 years would be allowed. It was expected that the trackless cars would be run at 3d. per mile cheaper than petrol buses. The Council is to promote a Bill in Parliament to give it the necessary powers.

Another move in the same direction lies in the fact that Nottingham Tramways Committee has decided to adopt the railless system on a route which is 2¼ miles long in substitution for existing tramways. The track is on a narrow road where there is no probability of widening being carried out. There will be ten railless cars, to cost about £25,000, and each will seat 26 passengers on the lower deck and 30 on the upper.

Indian Railways May Electrify

Electrification of some of the lines of the South Indian Railway connecting Madras City and nearby towns is forecast in proposals and estimates submitted to the Home Board for India. It is considered that electric service should be extended to Thambaram, 18 miles from Madras, and from Thambaram to Chingleput, 37 miles off Madras Beach. As a preliminary to electrification of the lines, the line from Madras Beach to Thambaram and then to Chingleput must be double-tracked.

Paris Subway Plans Further Extensions.—The Paris Transports en Commun expects to extend the Metropolitan Underground Railway with two connecting spurs running to the Place de la République from the Hotel de Ville and from the Richelieu-Drouot station. The company engineers and competent municipal and prefectoral authorities are studying the question at present and work will be begun as soon as the project is declared a work of "public utility" by the government.

Another London Tube Extension Opened.—The 3-mile extension of the London Electric Railway from Hendon to Edgware was opened for traffic on Aug. 18. This is a surface extension in the open country of the Charing Cross and Hampstead tube line. Daylight color signals were employed on the new extension, having proved satisfactory on Golder's Green and Hendon Line. Each of the 45 signals used consists of a powerful electric lamp behind an 8-in. lens. The light can be detected from a distance of 2,000 ft.

Financial and Corporate

Hydro-Electric Railways Report

Many Interesting Data Contained in Report on Canadian Roads for Year Ended Oct. 13, 1923

The Hydro-Electric Power Commission of the Province of Ontario has just reported for the year ended Oct. 31, 1923. The report deals with all phases of the operations of the commission for the year with respect to thirteen systems to which are connected 356 municipalities, including 107 townships and rural districts, and 110 industrial companies. The report also shows the cumulative financial results for the various periods during which operation has been maintained. The operations of the electric railways are covered in one of the sections. These roads are divided into the Essex District Railways, the Guelph District Railways and the Toronto & York District Railways. The first comprises 39.77 route miles, the second 8.49 and the third 80.06.

In commenting on the affairs of the Essex District Railways the commission says that the trackless-trolley line on Erie Avenue and Ottawa Street has been discontinued and is being replaced by a double-track railway line in order to take care of this rapidly growing section. Incidentally it is mentioned that the revenue secured by the trackless trolleys was approximately $750 a month. Since that system has been supplanted the revenue has grown to approximately $9,500 a month. The commission says that the operation of one-man cars in the Essex section has been satisfactory. For the year ended Oct. 31, 1923, the one-man safety cars were operated a total of 759,341 car-miles, and the accidents amounted to 26.47 per 100,000 car-miles, the cost of which was 0.47 cents per car-mile. The single-truck two-man cars were operated a total of 355,852 car-miles, and notwithstanding the fact that they operate in a district less congested the accidents, per 100,000 car-miles, were 22.76, the cost of accidents amounting to 0.503 cents per car-mile. The trackless trolleys, operating 82,053 car-miles, were responsible for 17.06 accidents per 100,000 car-miles, the cost being 0.395 cents per car-mile. This is also one-man operation. The total accidents were 20.59 per 100,000 car-miles and the cost was 0.416 cents per car-mile. The year before the commission took over the Essex lines approximately 1,000,000 car-miles were operated. This was for 1919. The mileage for the year ended Oct. 31, 1923, was approximately 1,800,000.

OPERATING STATISTICS OF THE ESSEX DISTRICT AND GUELPH RAILWAYS

	Essex	Guelph
Route-miles:		
City trolley	15.11	
City trollibus	5.01	
Amherstburg interurban	13.54	
Tecumseh interurban	6.11	
Total route-miles	39.77	8.49
Passenger and freight car-miles operated	1,825,171	300,577
Passenger and freight car-hours operated	217,486	37,563
Average number of employees	200	28
Accidents	375	80
Passengers carried	12,318,236	1,521,171
Percentage of transfer to revenue passengers	14.7	14
Passenger cars operated	55	7
Passengers carried per route-mile	309,736	156,237
Passengers carried per car-mile	6.9	4.4
Passengers carried per car-hour	58.8	37.5
Average mileage per car operated	32,232	42,931
Average passengers per car operated	223,968	—
Average riding (revenue) habit	137.7	72.1
Freight tonnage carried	19,989	

The net deficit of the Guelph District Railways for the year, payable by the city of Guelph, was $12,982, as compared with $22,911, for the previous year, notwithstanding the fact that the interest charges increased on account of the additional capital expended. In addition $1,264 was set aside as a provision for unredeemed tickets. The value of one of the carhouses, amounting to approximately $600, was written off capital, the carhouse having been destroyed by a wind-storm. In addition $256.30 was written off the valuation and other expenses in connection with the purchase of the line by the commission. The accidents on the line were 80 in number, most of them of a minor character.

The rehabilitation of the Guelph District Railways was completed during the year, with the exception of a portion of the track on the York road line from Carden Street to Waterloo Street through the Canadian National subway, and the line is now operating with very few delays and is giving a regular service. The monthly car-mileage has increased from approximately 14,000 to 27,600 car-miles. The one-man car operation has proved very successful and has decreased the cost of operation. The operating expenses have decreased, notwithstanding the fact that there has been a very heavy increase in car-mileage. The industrial conditions in Guelph have been such, for the past year, that the revenue shows a very slight increase. The closing of the summer term of the Agricultural College, and the absence of excursions from various points in Ontario during the summer months helped to decrease the revenue.

When the commission prepared its first report on the Guelph Street Railway, some four years ago, there was a scarcity of rolling stock and the second-hand value of cars was at a peak. There were delays in transferring the railway to the commission and still further delay on the part of the manufacturing companies in filling the commission's order for the new safety cars. After the new cars were delivered it was found that there was practically no market for the old double-truck cars. They were carefully gone over and the commission is now transferring this equipment to one of its other lines where the bodies will be rehabilitated and new trucks, motors, etc., supplied.

The Toronto & York Radial Railway has been operated by the commission since Nov. 1, 1922. It is explained by the commission in connection with the presentation of the operating statement that it is not possible to present comparative results for previous years because the records which have been kept in the past included the revenue and the mileage of the local service which was operated in connection with the Metropolitan division from Farnham Avenue to what was then known as Stop 26 and is now the new terminal for the interurban lines.

OPERATING STATISTICS OF THE TORONTO & YORK RADIAL RAILWAYS FOR 1923

Route miles—1923	Miles
Metropolitan and Schomberg and Aurora division	63.100
Scarboro division	8.349
Mimico division	8.620
Total	80.069
Passengers carried—1922-1923	
Metropolitan and Schomberg and Aurora division	1,969,800
Scarboro division	1,261,628
Mimico division	3,760,299
Total	6,991,727
Passenger car-miles operated	Miles
Metropolitan and Schomberg and Aurora division	723,553
Scarboro division	331,750
Mimico division	588,982
Total	1,644,285
Passengers carried per car-mile	
Metropolitan and Schomberg and Aurora division	2.72
Scarboro division	3.80
Mimico division	6.38
Freight tonnage carried	
Total freight, tons	130,616
Freight tonnage per car-mile, tons	0.981
Freight revenue per car-mile	$1.30
Freight revenue per route-mile	$2,735.47
Freight revenue per ton	$1.52

The operation of the system for the year ending Oct. 31, 1923, shows a net deficit of $204,505. This is accounted for by the loss of the revenue formerly received from the local line operation and the inability to decrease the operating expenses in the same ratio. The discontinuance of the local service occasioned a loss of 6 cents per passenger, being the amount of reduction in interurban fare which became effective with the change of terminal location which shortened the interurban journey. The gross revenue also shows a reduction on account of the transfer of the revenue received from the sale of

COMPARATIVE FIGURES SHOWING GROWTH OF THE ESSEX DISTRICT RAILWAYS

Year	1921–21	1921–22	Percentage of 1920–21	1922–23	Percentage of 1920–21
Passenger earnings	$488,185	$526,982	107.8	$625,601	128.1
Freight earnings	9,883	19,470	197.0	50,570	511.6
Miscellaneous earnings	7,757	10,339	133.2	12,244	157.8
Gross earnings	$505,826	$556,792	110.1	$688,416	136.5
Operating expenses	426,604	436,910	102.4	500,202	117.2
Net earnings	$79,222	$119,881	151.3	$188,214	237.5

STATEMENT OF EARNINGS AND EXPENDITURES OF THE TORONTO & YORK RADIAL RAILWAY FOR YEAR ENDED OCT. 31, 1923

Receipts	Metropolitan	Scarboro	Mimico	Total
Passenger	$356,822	$85,749	$207,898	$650,469
Freight	172,608	....	....	172,608
Rentals of property, including amount charged Niagara system for use of poles	11,206	1,015	40	12,262
Miscellaneous	6,787	1,511	469	8,768
	$547,424	$88,276	208,407	844,108
Net deficit (or surplus) for year after payment of interest on the bonds issued by the commission to cover its investment in the railways, but before making provision for renewal of road and equipment	184,067	28,300	(17,116)	195,252
	$731,492	$116,577	$191,291	$1,039,360
Expenditures				
Transportation expenses	173,124	39,806	85,120	298,051
Maintenance—way and structures	106,906	14,614	14,891	136,411
Manitenance—equipment	75,280	11,452	17,218	103,951
Power costs	115,963	18,409	29,881	164,254
General operating and management expenses	43,246	5,131	8,248	56,626
Proportion of the administrative and accounting expenses of the commission chargeable to the operation of the railways	31,208	4,172	6,788	42,168
Taxes	13,193	930	1,278	15,402
Insurance (fire and liability)	24,278	4,478	8,901	37,658
Written off valuation and other expenses re purchase by Hydro-Electric Power Commission	3,831	494	574	4,900
Total operating expenses	587,033	99,489	172,902	859,324
Interest: On bonds $2,375,000 issued by the Hydro-Electric Power Commission to cover the purchase price of the Railways	112,500	14,400	15,560	142,500
Bank and other interest	31,958	2,687	2,789	37,435
	$731,492	$116,577	$191,291	$1,039,360

power from the railway revenue account to that of the power department.

After a careful investigation the commission recommended a further capital expenditure of approximately $2,000,000 for the rehabilitation of the line and the purchase of new equipment. When these changes have been completed it is believed that these railways can be put on an operating basis that will take care of all necessary charges and permit a certain amount to be set aside for depreciation.

Toledo Still Going Behind

Operations of the Community Traction Company, Toledo, Ohio, for July showed a deficit of $56,033. This was after crediting the stabilizing fund with $22,074 power refund. Interest brought the stabilizing fund to a deficit of $30,431.

Gross revenue for the month was $276,549, compared with $314,330 for the corresponding month last year. A total of 3,937,039 revenue passengers was carried during the month, for a daily average of 127,000. In February the daily average was 182,092 revenue passengers. There are about 14,000 men at work in fifty-one plants in the city compared with 29,000 at work about a year ago.

Operating costs were $240,551. This is a cut of $20,560 from July last year. This year there is included an additional charge of $15,000 for extraordinary maintenance. The number of car miles operated in July this year was 595,850, compared with 669,950 in July a year ago.

Bus operation produced a revenue of $1,413 at an expense of $3,179. The Monroe-Central feeder line was discontinued after the month's trial.

With an additional purchase of $126,000 of Community Traction Company bonds from sinking fund the city will hold $722,000 of the common stock of the company. Interest on the retired bonds provides a monthly credit of $3,610 to the sinking fund.

Payment of dividends on the preferred stock of the Community Traction Company has been suspended by the company, but minority stockholders in Toledo are being paid by Henry L. Doherty & Company, to whom the dividends are being assigned.

Bond interest was paid by borrowing about $37,000 from Henry L. Doherty & Company on a demand note.

Car Trust Terms for Trenton Approved

Approval has been granted by the Board of Public Utility Commissioners to the car trust agreement entered into on July 8 by the Trenton & Mercer County Traction Corporation, Trenton, N. J., and the J. G. Brill Company. In the same action the board authorized the railway to issue ten serial notes aggregating $304,943. Of this amount $234,122 is listed as the principal and $70,821.85 as the interest thereon. The application of the railway to the commission was the outgrowth of the corporation's plan to add twenty new cars to the service—an improvement already approved by the commissioners.

Streator Abandons Railway Service

The Illinois Commerce Commission has issued an official order authorizing discontinuance of railway service in Streator, Ill., by the Illinois Light & Traction Company. The date for the abandonment was fixed at Nov. 1. The company has agreed to tear up its tracks and replace the pavement. In announcing its finding the commission states that the company had been operating at a loss for many years and that neither a change in the operating schedule nor rate of fare would insure a profit. It held that the company could not be expected to continue operation at a monthly loss, especially when a substitute service by bus was promised the moment the trolley ceased to operate.

It seems that the Streator Yellow Bus Company has been authorized by the commission to operate buses upon all lines desired by the City Council and subject to the latter's rules and regulations. The bus company is already operating in Streator, but not in competition with the railway. It promises to add new buses so as to take care of all sections of the city as outlined by the Council.

The city of Streator has a population of only 16,000. The railway there operates only 6 miles of line, of which 4.5 miles are in city streets.

Wants to Buy Trolley Equipment.—Fred Wilmoth, superintendent of the Meyersdale Light, Heat & Power Company, recently submitted an offer to the stockholders of the Pennsylvania & Maryland Street Railway, Elk Lick, Pa., whereby his company would purchase the trolley line and equipment. Mr. Wilmoth intimated that if his offer is accepted his company would continue to operate the line for general freight and passenger service. The power house at Boynton, near Salisbury, would be abandoned and the power secured from the Meyersdale plant, thus making cheaper operation possible.

Loss in Six Months' Period.—According to the semi-annual statement of the United Traction Company, Albany, N. Y., the company operated at a deficit for the first six months of 1924, although the number of passengers carried increased 13,415 over the number carried in the similar period of 1923 and despite decreases in operating costs. The loss was attributed to decreased income caused by loss of power sales and a decrease in passenger traffic for the second quarter. The revenue amounted to $1,670,367, a decrease of $32,396 over last year. Operating expenses were $1,353,345, compared with $1,410,342 last year. This saving, it was said, was offset by the taxes and loss of power sales. Net loss from operation during the six months amounted to $75,000, compared with $42,704 a year ago.

Co-operative Dividend Depends on Fare Increase.—In a statement accompanying the latest financial report of the Philadelphia Rapid Transit Company, Philadelphia, Pa., issued at a recent monthly meeting of the board of directors, it was brought out that as operating revenues have failed to maintain the usual rate of growth the payment of a large part of the co-operative wage dividend this year would depend on an increase in fare. Operating revenue for 1924 would appear now to be more than $2,000,000 less for the year than was anticipated. The petition of the company for an increase in its fares has been referred to previously in these columns. City Solicitor Gaffney sent to the Public Service Commission on Aug. 18 two additional complaints supplementing the protest recently filed by the city against the company's application for permission to increase its fare rate.

Operating Revenues Increase.—During the first month of operation under a 20 per cent increase in straight fares granted by the Maryland Public Service Commission the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., showed an increase in railway operating revenues from $218,031 in July, 1923, to $223,117 in July, 1924. Operating expenses increased from $143,720 to $151,758 in July of the present year. The net income also showed a falling off, being $33,463 in July, 1923, and $31,464 in July, 1924.

Prior Lien Stock Offered.—Pynchon & Company, New York, N. Y., are offering at $97 per share and accrued dividend to yield about 7.22 per cent 10,000 shares of the Middle West Utilities Company 7 per cent prior lien stock. The company, with headquarters in Chicago, operates eighteen electric railway lines through its subsidiaries.

Preference Stock Offered.—A syndicate headed by A. B. Leach & Co., Inc., is offering at $93, to yield more than 7.50 per cent, 32,500 shares of prior preference stock of the Virginian Power Company. The stock is known as series A. Through its subsidiaries the company furnishes the railway and interurban service to Portsmouth, Ohio, and vicinity.

Surplus Realized for Six Months.—For the six months period ended June 30, 1924, the net income of the Washington Railway & Electric Company, Washington, D. C., was $544,263, an increase of $132,946 over the previous year. After the payment of dividends for the first half of the year the company had a surplus of $169,000.

Railway Service Abandoned.—Bus service between Rocky Grove and Franklin, Pa., is to be started in the near future by the Citizens Traction Company, Oil City, Pa. Railway service will be abandoned. The company reserves the right, however, to restore railway service if bus service does not prove satisfactory.

Additional Issue of Tide Water Bonds.—An additional issue of $1,070,500 Tide Water Power Company first lien and refunding mortgage gold bonds, Series A, sinking fund 6 per cent, is offered at 97½, to yield in excess of 6.20 per cent, by Hemphill, Noyes & Company, Stroud & Company, Coffin & Burr, Inc., and Otis & Company, New York. The bonds are due on Oct. 1, 1942. The company furnishes electric light and power, gas and electric railway service in Wilmington, N. C., and nearby territory.

Receipts Show Decrease.—For the six months period ended June 30, 1924, the Boston Elevated Railway, Boston, Mass., realized total receipts of $17,612,609, against $17,448,488 for the similar period in 1923. The total cost of service for this period of the current year and last year respectively were $17,374,308 and $16,386,354. The excess of receipts over the cost of operation was $238,301 for the period of January through June, 1924, against $1,062,135 for the similar six months period of last year. The great disparity in the excess of receipts between the two years is found in the increase in maintaining track, cars and also in transportation expenses. Revenue passengers carried on a 10-cent fare in the period of January to June, 1924, numbered 145,077,613, against 145,392,522. Revenue passengers carried on a 5-cent fare increased from 49,668,497 for the six months period of 1923 to 54,096,867 for the similar period this year.

July Deficit Lower.—The deficit for operation of the United Electric Railways, Providence, R. I., during July was much less than for preceding months. According to the report filed with the Public Utilities Commission on Aug. 21 the deficit for July was only $28,801. This compares favorably with the "red ink" balance of $42,794 reported for June. The deficit for the seven months ended July 31 totals $252,313, after interest and taxes. Operating revenues for July totaled $676,772, compared with $655,962 for June, while total operating expenses were $620,025, against the June figure of $613,962. Net operating revenue jumped to $56,747 for July, up from $41,999 for June. Deduction of $86,779 for bond interest and taxes resulted in a July deficit of $28,801.

Gross and Net Earnings in Brazil Decrease.—The annual report of Brazilian Traction, Light & Power Company for the year ended Dec. 31, 1923, as issued in Toronto, shows gross operating earnings of $24,184,761, a decline of $1,321,659, or 5.18 per cent, from the figure reached in 1922. Net earnings from operation before provision for depreciation were $15,332,329, as compared with $16,299,229, a decrease of $966,900, or 5.93 per cent. This result, the report states, was due entirely to the decline in exchange as the earnings in Brazilian currency, both gross and net, exceeded those of any previous year.

Expects Lower Deficit.—The Tacoma Municipal Railway, Tacoma, Wash., is expected to show a better balance sheet in future monthly reports of the line, by reason of the action of the City Council in canceling book charges against the line for gross earnings tax, which has never been paid into the general fund, and directing that hereafter no gross earnings tax be charged against the line. The deficit of the car line will be reduced by $39,623 by cancellation of past gross earnings tax charges. The balance sheet hereafter will also show a reduction of current liabilities by $46,480, standing on the books as interest due the Emergency Fleet Corporation. Both this interest charge and a bonded indebtedness of $233,000 were wiped out by the settlement of the government loan recently. The line will hereafter show only $348,000 as the total amount of bonds outstanding.

Personal Items

DeWitt C. Baird, formerly connected with the Burke Garage, Inc., New Brunswick, N. J., has been appointed to supervice the operation of buses for the Public Service Transportation Company, a subsidiary of the Public Service Railway, in the New Brunswick district. Mr. Baird has had considerable experience in handling traffic, having served as district superintendent of the Public Service Railway. He was later transferred to the Perth Amboy district, but resigned his connections with the trolley company to enter the bus business with Thomas J. Burke, organizing the Burke Garage, Inc.

R. M. Orser is serving in the capacity of cost accountant on the staff of H. H. Couzens, vice-president of the Brazilian Traction, Light & Power Company's subsidiary companies with headquarters in Rio de Janeiro. He was formerly connected with the firm of Hagenah & Erickson of Chicago, which acted for the Toronto Railway in the arbitration case between the city and the company.

A. B. Paterson, ranking vice-president with the late A. L. Kempster of the New Orleans Public Service, Inc., New Orleans, La., operating the electric railways there, will for the present at least continue also to discharge the duties of the office of general manager, the title held by Mr. Kempster, in addition to that of vice-president. All during the long illness of Mr. Kempster Mr. Paterson acted in his stead.

George W. Jones, treasurer of the Brooklyn City Railroad, was made second vice-president and treasurer of the company at the last meeting of the board of directors. Mr. Jones has been treasurer of the company since the lines of the Brooklyn City Railroad were separated from the rest of the old Brooklyn Rapid Transit System in 1919. Before he joined the Brooklyn City Railroad forces Mr. Jones had been associated with Sanderson & Porter, New York, for many years.

Warren Hastings, assistant purchasing agent for the Northern Ohio Traction & Light Company, Akron, Ohio, for the past six years, has accepted a position with the Akron Oil Company as sales manager.

B. F. Lyons is president of the Kewanee & Galva Railway, Kewanee, Ill., which he recently purchased. Mr. Lyons was formerly vice-president and general manager of the Beloit Water, Gas & Electric Company, Beloit, Wis. In Mr. Lyons' efforts to restore these rehabilitated properties connecting Galva and Kewanee to a paying basis he will be assisted by George A. Mills as vice-president and general manager.

W. B. Miser, at one time operating manager and general sales manager of the Illinois Traction Company, Peoria, Ill., operating railway, electric light and power and gas properties, has recently been made commercial manager of the Emporia division of the Kansas Electric Power Company. He has served as branch manager with the Westinghouse Electric & Manufacturing Company.

Obituary

Walter B. Lewis, cashier of the Springfield Traction Company, Springfield, Mo., died recently. He entered the employ of the company about 14 years ago as a conductor. He became cashier about six years ago.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

England and Holland Are Recovering Commercially

Many Obstacles to Business Prosperity Still to Be Overcome—Some Good Underlying Conditions

E. J. Mehren, vice-president of the McGraw-Hill Company, has just returned from a European trip, during which he attended the Advertising Convention and Power Conference in London and visited a number of countries on the Continent. Below will be found some notes by him on business conditions in England and Holland.

ENGLAND FIVE YEARS AFTER THE PEACE

The war is only a yesterday with Britain and the consequences are still sharp upon her. I do not mean that she is discouraged; that word has no place in the British vocabulary, nor has the state of mind it indicates any place in British consciousness. But the burdens that weigh her, the obstacles still to be overcome, are fully appreciated and are a stock subject of discussion will all her thinking men.

To enumerate some of the troubling factors:

1. There is still large unemployment, though the amount is lessening.

2. There is marked depression in the "engineering trades," as they are called here—shipbuilding, machine tool building and the metal fabricating industries generally. In construction there are few large projects in hand, though there are a few that, after long delay, now seem likely to be taken in hand.

3. A new housing bill, that will again dip heavily into the national and into local government treasuries—and increase, accordingly, national and local tax burdens—is before Parliament.

4. The income tax rate on even small incomes is 4 shillings 6 pence per pound sterling, or 22½ per cent. The super-taxes are very heavy.

5. The continental problem is acute and the consequent uncertainty, the upset exchanges, the diminished purchasing power curtail British export markets.

6. Finally, the never-ending exchange of views with their continental war allies on German reparations keeps before the British people constantly the fact that peace, though declared five years ago, is not yet here. There is cessation of military activity; there is not that accord which is peace in actuality.

That the consciousness of the international element in these difficulties is ever present with the thinking Britisher was strikingly demonstrated in addresses at the great advertising convention held at the British Empire Exhibition last month. Man after man emphasized the distressed position of Europe and expressed the hope that out of the international discussions now under way in London, and participated in by the United States, there may come that peaceful adjustment for which Europe has been longing since Nov. 11, 1918.

In private conversation one gets an even more serious picture of England's difficulties, for there the talk turns to social conditions. Briefly, the burden of these conversations can be reduced to just this—that the altruistic promises of wartimes and the coddling of politicians have taken from the mass of British workers a sense of responsibility for their own welfare and led them to expect the government to take care of them. Thrice, indeed, was the statement made to me, and in separate conversations, that there was a growing opinion, fostered by socialist agitators and politicians, that if the people would have the babies the government would do all else. Such an attitude, of course, leads, and has led, to shiftlessness, inefficiency when at work, failure to provide for the rainy day—in a word, all of the economic vices of a dependent, spineless people.

Withal, though, it should be repeated that the Englishman is not discouraged. He has lived through a lot. He hopes that he will live through this trying period, and that a better day will come.

HOLLAND'S POST-WAR DIFFICULTIES

The innocent bystander often is hurt. So it was with Holland during the war. So it is now. Holland, in common with the former belligerents, is suffering from the effects of the world's decreased purchasing power.

During the war, it will be recalled, Holland suffered severely. She had no military participation in the conflict, but her economic relations with all the world were disrupted. Her food supply was diminished and strict rationing was necessary. So she shared the war hardships.

After the war her course, economically, followed that of the other nations. She had a period of hectic activity, construed, at the time, as an evidence of prosperity. Then came the slump—and Holland has not even yet fully recovered.

The Hollanders say that labor conditions are improving. Wages have come down from the peak, efficiency is increasing, and hours of labor, though fixed at 45 per week by law, have been increased in a few cases. The turn for the better in the labor attitude seems to have come, even though conditions are far from being as good as they were before the war.

INCREASE IN POPULATION A PROBLEM

Holland has another large economic problem before it. The population is increasing quite rapidly, but the country has no colonies of its own to attract immigrants. Thus far it has been mainly agricultural. The lands to be made by the Zuyder Zee drainage will offer only a small measure of relief to a population inclined toward becoming an industrial one. Economically, therefore, the problem is pressing and its solution is likely to have very important results for that country. Holland appreciates this.

Order Placed for Motors for Staten Island Electrification

An order has been placed with the General Electric Company for 80 two-motor equipments for use on cars in the electrification of approximately 17 miles of double-track passenger line of the Staten Island Rapid Transit Company and the Staten Island Railway, now under way.

The motor equipments will be installed on subway type of steel coaches seating 71 passengers. Each coach is separately driven with two motors of 200 hp., operating at 600 volts and equipped with G. E. type PC-10 control. Current to the trains will be supplied through a top contact third rail.

The cars are to be manufactured by the Standard Steel Car Company. They will be similar to those now operating in the subways of the Brooklyn-Manhattan Transit Corporation.

Details of the cars, the third-rail and other features of the installation were reviewed in an article in the issue of the ELECTRIC RAILWAY JOURNAL for May 17, page 776.

84,424 Square Feet of Space Sold for A.E.R.A. Convention

Practically 200 manufacturers will use 84,424 sq.ft. of display space at Atlantic City next month for the forty-third annual convention of the American Electric Railway Association. About 27 per cent of the space will be given over to bus exhibits, but the requests for space from manufacturers of buses had to be cut more than 6,000 sq.ft. in order to accommodate all who desired to exhibit.

The arrival of all buses intended to be on exhibition is to be scheduled. In order to avoid confusion, the association has decided that each company shall have its bus arrive at Atlantic City at a time that will permit it to be put into place before the bus next nearest the street entrance is permitted to go on the Pier. This will eliminate accidents, and do away with any possible congestion in handling material of other exhibitors. It is aimed to have all exhibits ready for inspection at 2 p.m., Sunday, Oct. 5, at which time the exhibit committee will make its tour of inspection.

Metal, Coal and Material Prices

Metals—New York	Aug. 26, 1924
Copper, electrolytic, cents per lb.	13.313
Copper wire base, cents per lb.	15.50
Lead, cents per lb.	8.025
Zinc, cents per lb.	6.212
Tin, Straits, cents per lb.	51.875
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.15
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons.	1.875
Franklin, Ill., screenings, Chicago, net tons	1.875
Central, Ill., screenings, Chicago, net tons	1.55
Kansas screenings, Kansas City, net tons.	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.55
Weatherproof wire base, N. Y., cents per lb.	18.50
Cement, Chicago net prices, without bags.	2.20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.05
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.12
Turpentine (bbl. lots), N. Y., per gal.	0.90

Rolling Stock

Worcester Consolidated Street Railway, Worcester, Mass., has recently purchased 10 30-ft. double-truck, prepayment, semi-convertible cars from the Osgood-Bradley Car Company. The specifications of these cars follow:

Date order was placed	Nov. 22, 1923
Date of delivery	March, 1924
Seating capacity	44
Weights:	
Car body	19,760 lb.
Trucks	12,000 lb.
Equipment	11,180 lb.
Total	42,940 lb.
Bolster centers, length	19 ft.
Length over all	44 ft.
Truck wheelbase	4 ft. 6 in.
Width over all	8 ft. 8½ in.
Height, rail to trolley base	11 ft. 7 in.
Body	Semi-steel
Interior trim	Mahogany
Headlining	Agasote
Roof	Arch
Air Brakes	General Electric
Armature bearings	Sleeve
Axles	Hot forged
Bumpers	Hedley anti-chamber
Car signal system	Faraday buzzer
Car trimmings	Statuary bronze
Center and side bearings	Plain
Compressor	GE, CP-27
Control	K-35C
Drawbars	Metropolitan type
Curtains	None
Destination signs	Keystone
Door operating mechanism:	Osgood-Bradley
Fare boxes	International
Gears and pinions	Tool Steel
Hand brakes	Peacock, staff
Heater equipment	Gold
Headlights	Neal
Journal boxes	Symington M.C.B. type
Lightning arresters	General Electric MD.
Motors	Four GE-200J, outside hung
Power saving device	Arthur
Registers	International
Safety devices	Standard
Sanders	Murphy
Sash fixtures:	National No. 102 Lock and two Howard compression rolls.
Seats	Osgood-Bradley, slat
Slack adjuster	Turnbuckles
Springs	Double full elliptical and coil
Step treads	Kass
Track scrapers	Air operated
Trolley catchers	Wilson No. 2-C
Thermostats	Utility
Trolley base	U.S. 13
Trolley wheels	4¼-in. diameter
Trucks	Standard O-50
Ventilators	8 Osgood-Bradley exhaust
Wheels	33-in. steel

Track and Line

Omaha & Council Bluffs Street Railway, Council Bluffs, Iowa, has begun the work of tearing out the old paving from between the tracks on Pierce Street and is replacing rails with heavier steel.

Dallas Railway, Dallas, Texas will start work Sept. 1 on the Ervay Street line extension decided on nearly a year ago by the city and the railway company.

San Diego Electric Railway, San Diego, Cal. will construct a connecting link between the dock terminals of the city and the lines of the San Diego & Arizona Railway. This will serve as the first unit of a municipal harbor belt line. The line will be a standard gage line running from Atlantic and Market Streets, over Belt Street on the tidelands to the foot of G Street. It will be approximately three blocks long. It will be financed by the San Diego Electric Railway, but it eventually will be taken over by the city. The plans for the line contemplate including it later in a belt line system which eventually will feed the entire industrial and shipping enterprises of the city. For the time being it will be used for the handling of cargoes and for the distribution of the cargoes through the city.

Capital Traction Company, Washington, D. C., is putting in new track on Fifteenth Street for a stretch of two blocks at a cost of $25,000. The company has just completed the paving work on Connecticut Avenue. The work accomplished extended for a distance of 10,000 ft. and cost altogether about $172,500. It included paving with concrete in the tracks, between them and for 2 ft. outside the outside rails. In addition new ties, spikes and bonds were put in. The concreting alone cost about $85,000.

Los Angeles Railway, Los Angeles, Cal., will soon start reconstructing its track on Griffin Avenue with 116-lb. rail. Track reconstruction on Second Avenue has been completed.

Power Houses, Shops and Buildings

Cincinnati, Georgetown & Portsmouth Railroad, Cincinnati, Ohio, has awarded a contract for the erection of a car shop on the south side of Dumont Avenue, Cincinnati. The building will be constructed of brick and reinforced concrete and will be utilized for the repair of cars.

Elmira Water, Light & Railroad Company, Elmira, N. Y., plans to build a power house and transformer station on First Street and Railroad Avenue, Elmira, at a cost of $40,000.

Hartford & Springfield Street Railway, Warehouse Point, Conn., is negotiating for a central location for a railway and bus terminal. Search by Manager Hambleton for a suitable terminals has led Thomas H. Benton, supervisor of public motor transportation in Springfield, to stir the issue of a municipal motor bus terminal with a waiting station for various lines entering the city.

Trade Notes

Industrial Works announces the opening of a new district office at 455 Monadnock Building, San Francisco. Cal., in charge of J. M. McGuire, district sales manager.

Albert Swartz is representing the Arcco Anti-Rail-Creeper Company in Chicago territory with offices at 1526 Manhattan Building. Mr. Swartz was formerly manager of the Toledo & Western Railroad, Toledo, Ohio.

Sykes Company, St. Louis, Mo., has been incorporated with a capital stock of $100,000 to manufacture, sell and design automotive railway motor coaches and passenger trailers. C. E. Sykes is the president and Charles S. Lynch secretary and principal agent. The office is located at 1400 Liberty Central Trust Building, St. Louis.

Mitchell - Rand Manufacturing Company, New York, N. Y., is distributing thousands of sample wedges loose in an envelope, which enables them to be more readily tested for size in the armature. Heretofore the samples have been attached to a card. Each of the wedges is numbered. The envelope shows the style number, thickness and price of the different wedges. It has en eyelet at the top which enables it to be hung on a nail in the shop ready for instant use.

Railway Improvement Company, New York, N. Y., has taken over the manufacture and sale of the Hartman center plate, the Perry street car side bearing, the Paragon side bearing, the Woodman side bearing and the Peerless street car side bearing.

Osborne E. Quintin, formerly of the Continental Railway Specialty Company and Burry Railway Supply Company, Chicago, has severed his connections with these companies to enter the sales department of the Railway Improvement Company, which organization is taking over the manufacture and sale of the products of the Continental Railway Specialty Company, including the Hartman center plates, Perry side bearings, Paragon side bearings, Woodman side bearings and Peerless side bearings. Mr. Quintin spent several years in newspaper and financial work and from 1909 to 1914 was Western sales manager of the American Silver Company. In 1914 he became sales manager of the Peter Smith Heater Company and later vice-president and general manager of that organization. During the war period he superintended the testing and inspection of heating equipment used on submarines and submarine chasers, and in 1919 became secretary and treasurer of the Holden & White Company, which later merged with the Railway Supply Company. With the Railway Improvement Company Mr. Quintin will be located in the Chicago office.

New Advertising Literature

American Engineering Company, Philadelphia, Pa., has issued a fifty-page pamphlet describing the new Taylor stoker. Copies are being distributed by the company gratuitously upon request.

Line Equipment Sales Company, Cleveland, Ohio, has issued Catalog No. 1, a data book of materials and supplies for line construction and maintenance work.

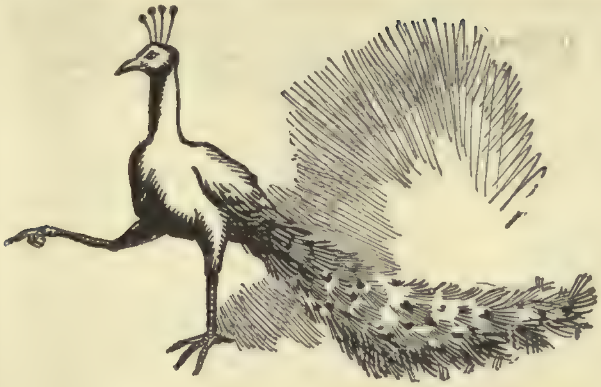
International Motor Company, New York, N. Y., has issued a folder describing the Mack buses. Illustrations include the city bus body, the sedan bus body and high spots of the chassis design.

Cleveland Twist Drill Company, Cleveland, Ohio, has put into booklet form the records of the tests of the Cle-Forge high speed drills exhibited at the recent convention of the American Railway Association, Mechanical Division. The company hopes that the booklet will be of value to all drill users.

Stopped by a cow!

(Editorial from Street Railway Journal, ——189—)

"A runaway car in ————, through the failure of a patent brake in trial on it, came near resulting very seriously. In fact, had it not been that *by a miracle of good fortune the car ran into a cow* in its rush downhill and was stopped by the animal, a general smashup might have ensued. We believe heartily in encouraging invention. Numbers of good things are being continually brought out, which if untried could never establish their merits; but too much care cannot be taken to guard against such a mischance as the runaway in question."



That was over thirty years ago

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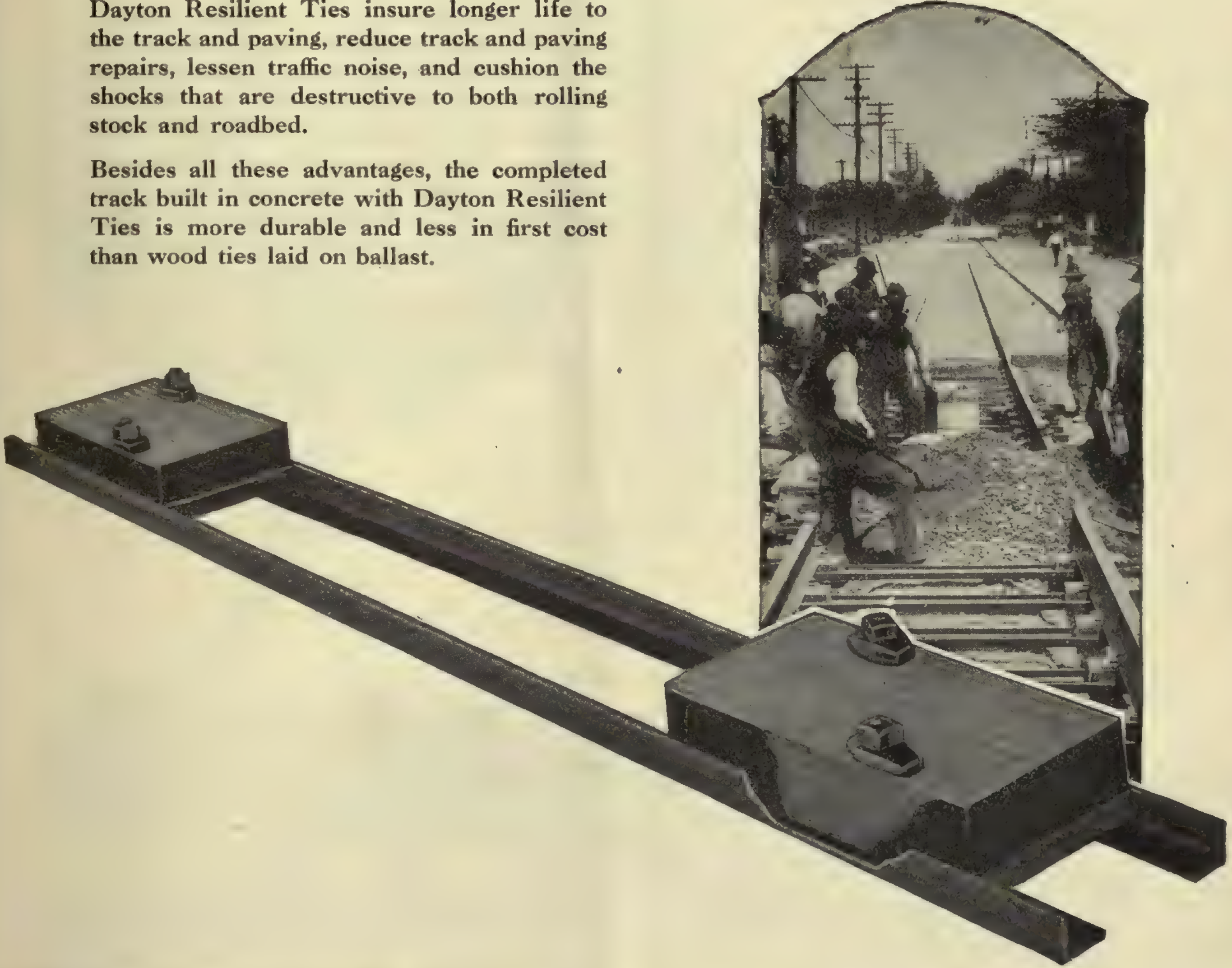

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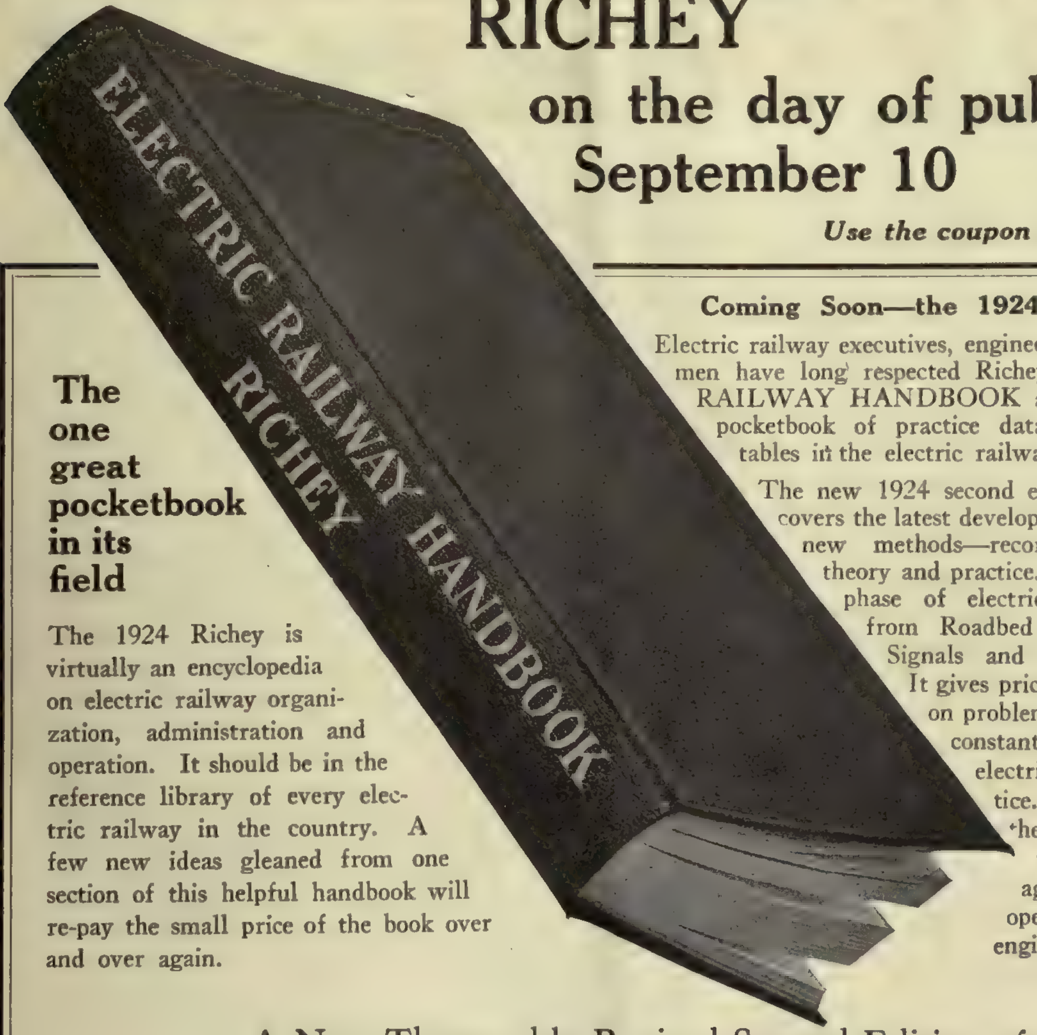

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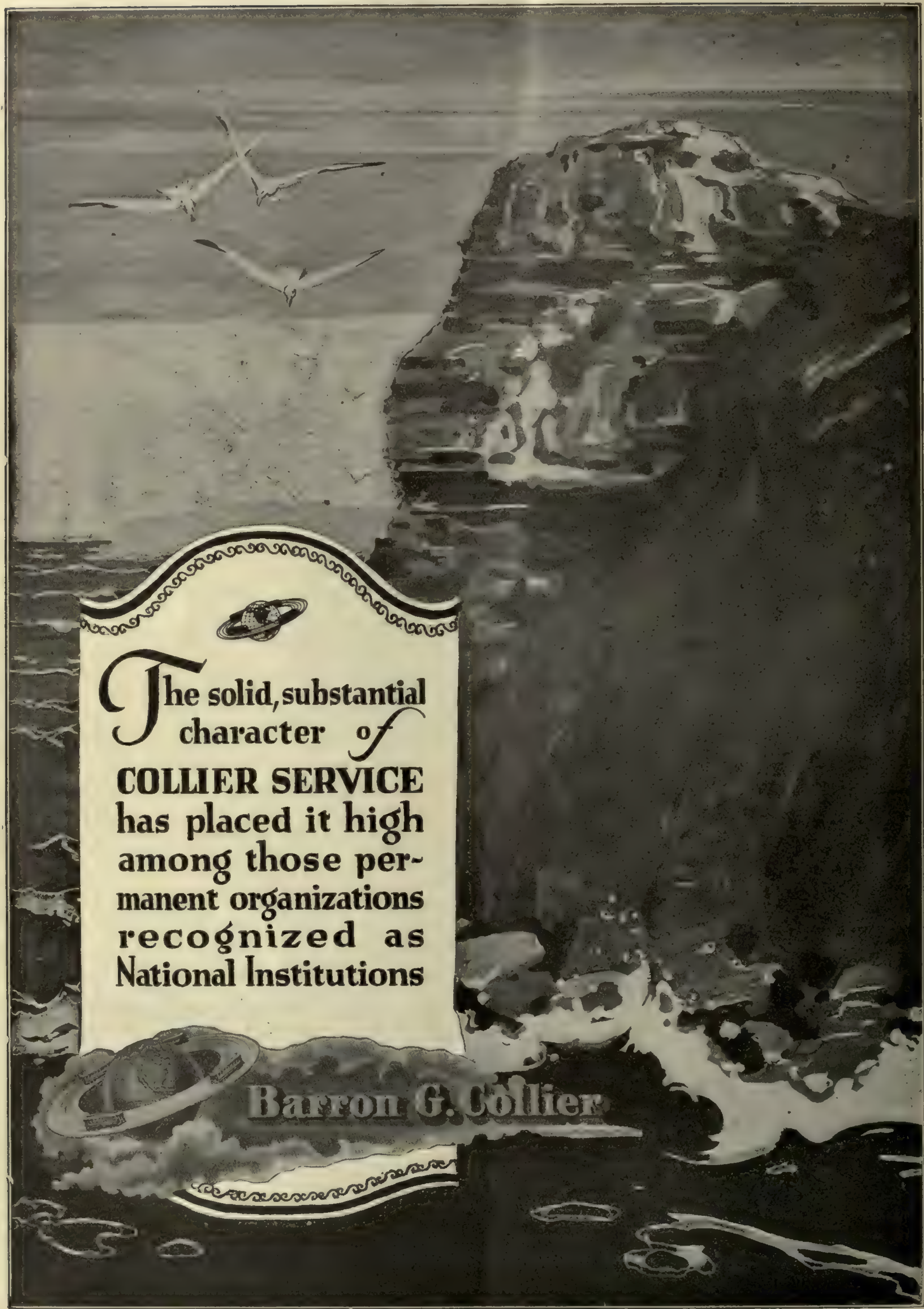
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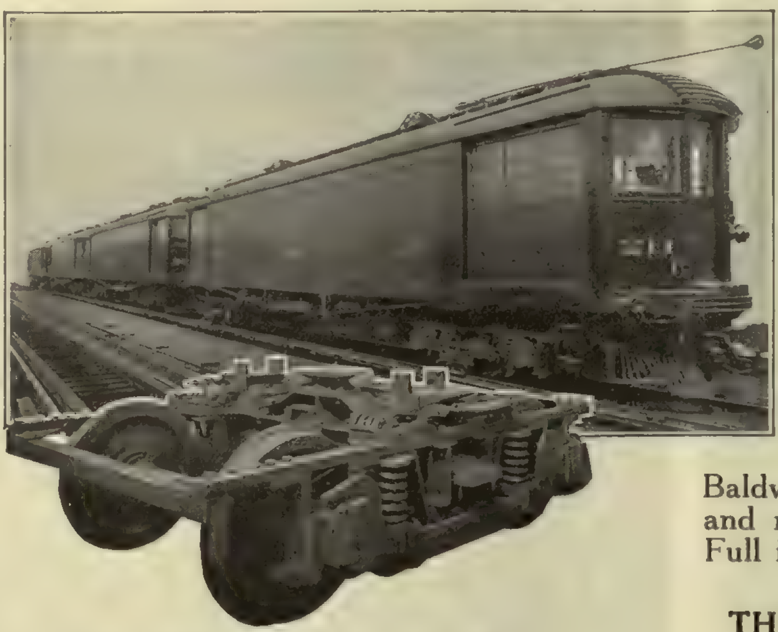

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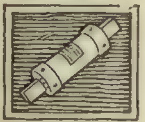
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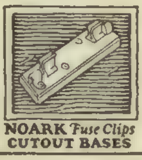
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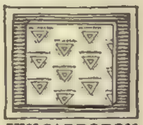
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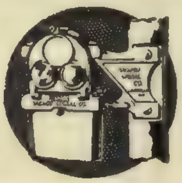

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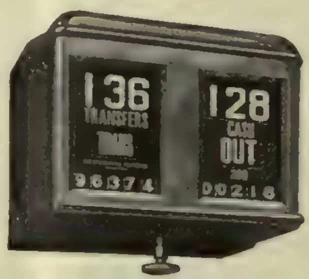

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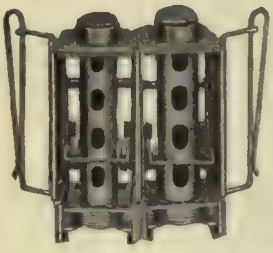

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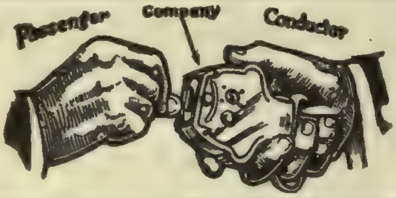

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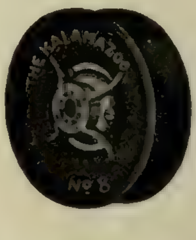
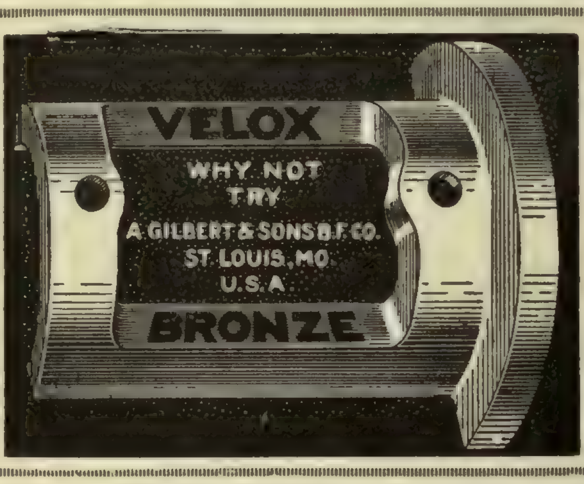
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



VELOX
WHY NOT TRY
A. GILBERT & SONS B.F. CO.
ST. LOUIS, MO.
U.S.A.
BRONZE

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

PANELYTE

HEADLININGS

THE PANELYTE COMPANY, Trenton, N. J.

Only reliable products can be continuously advertised.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 11 inches	4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An *advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.&M. J.-P.

POSITIONS VACANT

CIVIL engineer: Graduate preferred, experienced in engineering or track department; permanent position; state specifically education, experience, references and salary expected. P-734, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

GENERAL line foreman, experienced on city and high speed interurban work. PW-726, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITION wanted as general manager by a man that has experience in all departments, equipment and shop, track and line power house, transportation and office experience, as well as purchasing agent, and claims has been at the head of each department, and manager for 8 years, now employed, desires a change. Age 47, reference. PW-733, Electric Railway Journal, 10th Ave. at 36th St., New York.

YOUNG man experienced as inspector, time table and chief clerk, would like to make change. Prefer South or mid-west. PW-729, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

For Sale—Built in 1920

2—Kuhlman Semi-Steel Interurban Cars, Passenger, Smoker and Baggage.

Length 54-ft. 7¼-in.; width 8-ft. 6-in.
Brill 27 MCB 2 Trucks.
4 G. E. 203 motors. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

When Writing Your Ad

Provide an indexing or subject word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column.

The right is reserved to reject, revise or properly classify all Want Advertisements.

Proper Classification

increases the possibility of

Prompt Returns

0301

FOR SALE

Or Will Trade for Suitable Street Railway Buses

1—150 kw., 60 cy., 3 ph., Westinghouse Converter, with transformers and switchboards, complete. 2,300 volt A.C., 600 D.C.

5—Brill One Man, Two Man Cars, 28 passengers, newly repainted green enamel. Brill 21-E trucks, 33-in. wheels, 2¼-in. face, West. 12-A motors.

4,000 ft. number 2 nought Weatherproof Cable.

Above can be seen in operation every day at Selma, Alabama. Address replies to

W. E. NEES, Supt. and P. A.
Selma Electric Ry. Co.
Selma, Ala.

FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES

All Rails and Track Materials shipped subject to inspection and approval at destination.

L. B. Foster Co.
PITTSBURGH-PA
NEW YORK
©L.B.F.C.

FOR SALE

SCREW SPIKES

Approximately 40,000 ¾x5½-in. manufactuerd by Illinois Steel Company. Good condition—have not been used.

Purchasing Department
The Kansas City Railways Company
Kansas City, Missouri

FOR SALE

3 WHITE "50"

Motor Coaches

10 months old

Kuhlman 25-passenger bodies. Run 15,000 miles. Original tires still operating. Will be painted, lettered and fitted with new tires. Owners lost franchise.

Code "BULO"

Transit Equipment Co.
Cars—Motors
501 Fifth Avenue, New York

We offer for immediate shipment

SYNCHRONOUS CONVERTER

General Electric

1—Type HCC-4, 1000 kw., 750 r.p.m., 600 v., 25 cy., 6 ph., compound wound, commutating pole synchronous converter, complete with brush raising device, speed limit and magnetic end play devices, field break up and equalizer switches and field rheostat.

This includes one Transformer, type H. J. T. H., 3 ph., 6 ph., 1050 kva., 6900/13800 Y-445 v. oil cooled, complete with oil.

We also include switchboard and all component parts to make this unit complete. It was installed brand new in 1918, used for three months only, and guaranteed at this time practically good as new.

Jos. Greenspon's Sons Iron & Steel Company
3130 Hall St., St. Louis, Mo.

EXPERIENCED ENGINEER AND SALES PROMOTION EXECUTIVE

with keen organization instinct and intimate knowledge of developing foreign sales (particularly in Poland and the Near East)

Is Open for Responsible Sales Promotion Connection

where opportunities are sufficiently broad to permit full development of ability in expanding sales promotion plans. Promotion work for some large public utility consolidation indicates character of opening desired. Successful record of executive sales work in unusually responsible positions assures profitable arrangement for company.

PW-727, Electric Railway Journal, 10th Ave. at 36th St., New York City

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Babbitt Metal
Ajax Metal Company

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Bearings and Bearing Metals
Ajax Metal Company
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
Gilbert & Sons B. F. Co., A.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Baldwin Locomotive Works
Stucki Co., A.

Bearings, Roller
Hyatt Roller Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Boilers
Babcock & Wilcox Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Boxes, Switch
Johns-Pratt Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co
Westinghouse Tr. Br. Co.

Brake Shoes
Amer Br Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Morganite Brush Co.
Westinghouse E. & M. Co.

Brushes, Graphite
Morganite Brush Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
International Motor Co.
New York Transportation Co.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Cables. (See Wires and Cables.)

Cambric Tapes, Yellow and Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heati'g Co.
Westinghouse E. & M. Co.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Castings, Brass, Composition or Copper
Ajax Metal Company
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.

Coils Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

Concrete Reinforcing Bars
Laclede Steel Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Cranes
American Engineering Wks.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Transit Equipment Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car H't'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Economizers
Power Specialty Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly-Cooke Co.
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Floodlights
Elec. Service Supplies Co.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Fuses and Fuse Boxes
Consolidated Car Heati'g Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Cartridge, Non-Refillable & High Voltage
Johns-Pratt Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Bethlehem Steel Co.
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind. Supplies
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Bricks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.

Heaters, Car (Electric)
Consolidated Car Heati'g Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

Heaters for Special Purposes
Power Specialty Co.

Helmets—Welding
Railway Track-work Co.

Hoists, Portable
Ingersoll-Rand Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

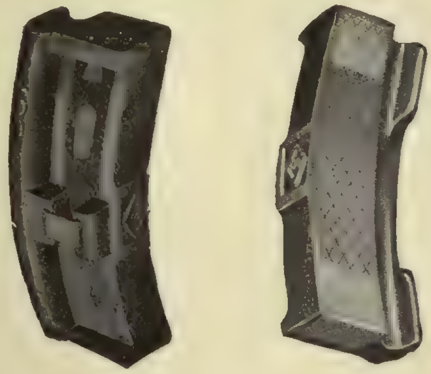
Indicating Signals
Oskel Equipment Co.

Instruments Measuring, Testing and Recording
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Co.
Stand. Underground Cable
Westinghouse E. & M. Co.

BRAKE SHOES

AERA Standards
Brake Heads



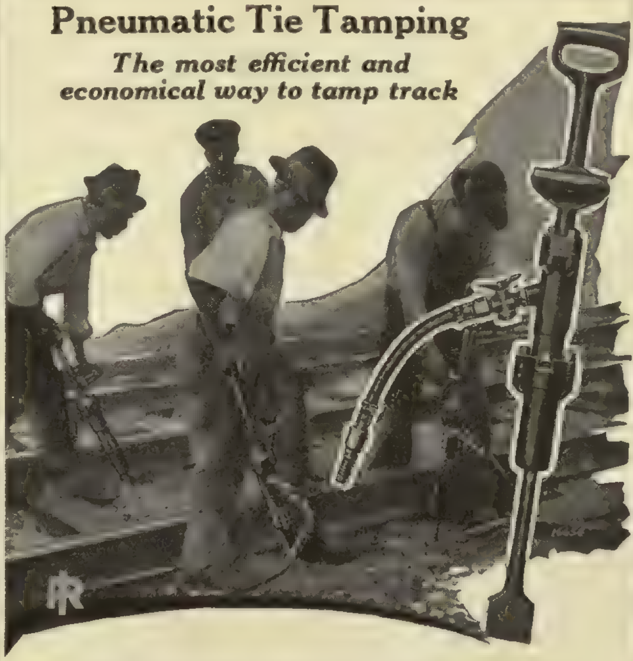
Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago

Pneumatic Tie Tamping

The most efficient and economical way to tamp track



Four men with Pneumatic Tampers will tamp more track than twelve to sixteen men with picks or tamping bars and the work will last twice as long as if it had been done by hand.

Ingersoll Rand
11 Broadway, New York

Multiple Unit Control, double truck car for two-man operation.

McGUIRE-CUMMINGS

Manufacturing Company

General Offices
111 W. Monroe St., Chicago, Ill.

Street Cars, Trucks
Snow Sweepers

M-J

ARMATURE BABBITT

—for railway motor bearings

Scientifically compounded of pure new tin, copper, antimony and metallic nickel—no lead.

It lasts longer—can be used over and over again.

Strong
Tough
Durable

MORE-JONES
Brass & Metal Co.
St. Louis, Mo.

TULC
A
LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

Insulating, Silk & Varnish
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irviagton Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co., Inc.

Jacks (See also Cranes, Hoists and Lifts)
Buda Company
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.

Junction Boxes
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locomotives, Electric
Baldwin Locomotive Works
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co

Lubricating Engineers
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Co.
Texas Company
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel, Special Track Work
Bethlehem Steel Co.

Manganese Steel Switches Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants).

Oil Heaters
Power Specialty Co.

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Packing
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Paints and Varnishes (Insulating)
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co

Pavement Breakers
Ingersoll-Rand Co.

Paving Guards, Steel
Godwin Co., Inc., W. S.

Paving Material
Amer. Br. Shoe & Fdy. Co

Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Poles & Ties Treated
Bell Lumber Co.
International Creosoting & Construction Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
International Creosoting & Construction Co.

Poles, Trolley
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

Porcelain Special High Voltage
Lapp Insulator Co., Inc.

Portable Grinders
Buda Company

Potheads
Okonite Co.

Power Saving Devices
National Ry. Appliance Co.
Railway Improvement Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

Pumps, Vacuum
Ingersoll-Rand Co.

Punches, Ticket
Bonney-Vehslage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Filler
Philip Carey Co.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Rail Joint Co.

Rail Joints—Welded
Lorain Steel Co.

Rails, Relaying
Foster Co., L. B.

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rail Welding
Railway Track-work Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Rg. Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Elec. Service Sup. Co.

Resistances
Consolidated Car Heat. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Roofs
Haskelite Mfg. Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.
St. Louis Car Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.

Seats, Bus
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co, The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

Seating Materials
Brill Co., J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.
Transit Equipment Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.
Oskel Equipment Co.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
Wood Co., Chas. N.

Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
Anderson Mfg. Co., A.&J.M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Metal & Brass Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow Sweepers, Rattan
Heywood-Wakefield Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)
Irvington Varnish & Ins. Co.

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel Foundries
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steel and Steel Products
Carnegie Steel Co.

Steps, Car
Brill Co., J. G., The
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.
Oskel Equipment Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

Strand
Roebling's Sons Co., J. A.

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Railway Improvement Co.

Subway Boxes
Johns-Pratt Co.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches, Safety
Johns-Pratt Co.

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Tamper Tie
Ingersoll-Rand Co.
Railway Track-work Co.

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Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Elec. Service Supplies Co.

Ties, All-Metal
Metal Safety R. R. Tie Co.

Ties and Tie Rods, Steel
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tool Steel
Bethlehem Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Torches, Acetylene (See Cutting Apparatus)

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Grinders
Railway Track-work Co.

Trackless Trolley Cars
Brill Co., J. G., The
St. Louis Car Co.

Track, Special Work
Barbour-Stockwell Co.
Bethlehem Steel Co.
Buda Company
New York Switch & Crossing Co.
Ramapo Ajax Corp.

Transfer (See Tickets)

Transfer Issuing Machines
Ohmer Fare Register Co.

Transfer Tables
American Bridge Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety, Stair, Car Step
Morton Mfg. Co.

Trolley Bases
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

Trolley Wheel Bushings
More-Jones Brass & Metal Co.

Trolley Wheels & Harps
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Baldwin Locomotive Works
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg.Co.
St. Louis Car Co.

Tubing, Yellow & Black Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Turbines, Water
Allis-Chalmers Mfg. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Irvington Varnish & Ins. Co

Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Welded Rail Joints
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
Ohio Brass Co.
Railway Track-work Co.

Welders, Portable Electric
Elec. Ry. Improvement Co.
Ohio Brass Co.
Railway Track-work Co.

Welding Processes and Apparatus
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Welding Steel
Elec. Ry. Improvement Co.
Railway Track-work Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Bemis Car Truck Co.
Carnegie Steel Co.

Wheels, Car, Steel and Steel Tire
American Steel Foundries

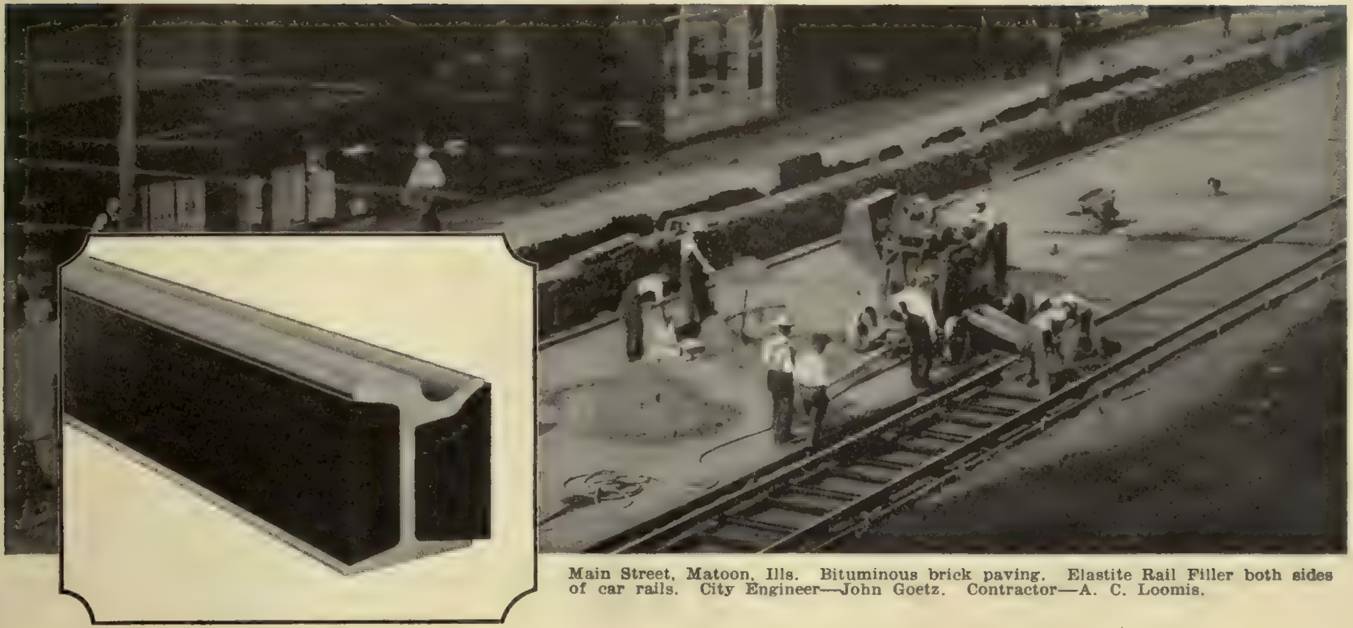
Wheels, Wrought Steel
Carnegie Steel Co.

Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Wire Rope
Roebling's Sons Co., J. A.

Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Std. Underground Cable Co.
Westinghouse E. & M. Co.



Main Street, Matoon, Ills. Bituminous brick paving. Elastite Rail Filler both sides of car rails. City Engineer—John Goetz. Contractor—A. C. Loomis.

This is the way to reduce track repair costs

The principal causes of paving deterioration along car rails are *vibration* and *impact*. Secondly—*water seepage* and *frost-action*.

Carey Elastite Rail Filler absorbs this destructive vibration and cushions the paving against traffic shocks. It maintains a close water-tight joint and keeps water and frost out. It reduces traffic noise to a minimum.

Years of service in extensive installations show conclusively the great savings in repair costs effected by Elastite Rail Filler. It does not wear out and never needs replacement. It saves upkeep costs and lengthens the life of trackage investment.

Supplied to fit any weight or contour of rail. Write for literature. Send exact sketch of rail size and contour and state lineal feet required in writing for prices.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, O.

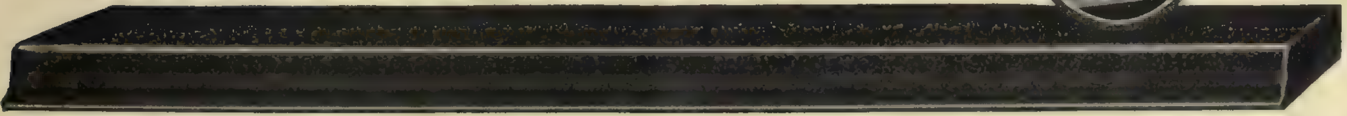
Elastite Rail Filler Is Easy to Install

a tap of a mallet holds it in the web of the rail.

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail vibration, and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite
NAME REG. U.S. Patent Office

RAIL FILLER



The Philip Carey Co., Lockland, Cin., O.
Please send sample of Carey Elastite Rail Filler and price per 100 ft. for the following sections: (Or send blueprint or full size sketch showing rail cross-section.)

Weight ....
Sec. No. ....
Mfr's. Name ......

Name .... Title ....
Address ....
City .... State ....

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SIDE
BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

For better Axles Specify
"VALSCO"
HEAT TREATED CAR AXLES
LACLEDE STEEL CO.
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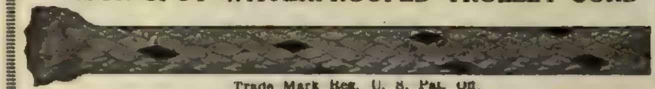

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Samples and information gladly sent.
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KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
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We guarantee
all grades of poles; also any butt-treating specifications
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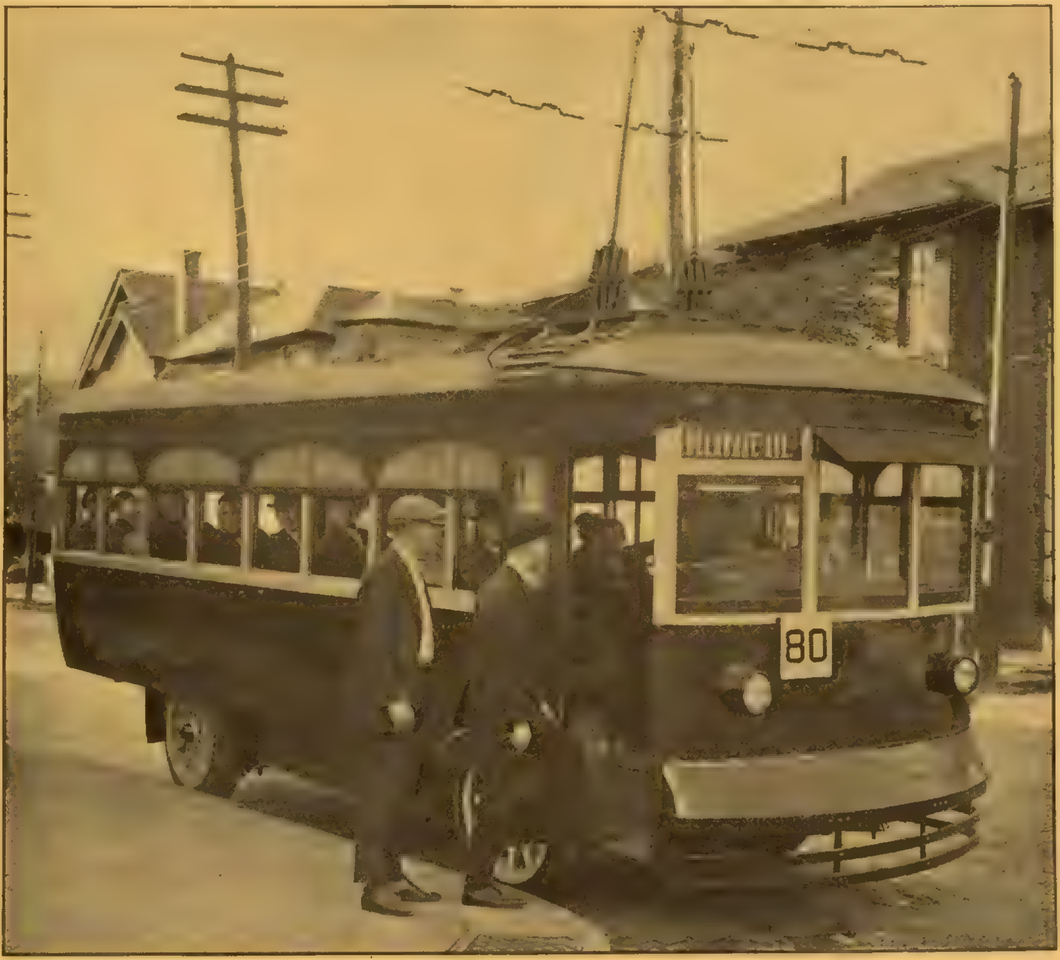
J. R. JOHNSON AND CO., INC.
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.



Brill Railless Cars

in Philadelphia

Supplementary service as feeders to intersecting railway lines, is being furnished by Brill Railless Cars on Oregon Avenue in Philadelphia. This type equipment not only has the advantage of economical operation characteristic of electrically-propelled vehicles, but also railway organizations are generally familiar with equipment of this type, which reduces maintenance.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.

On the Aurora, Elgin & Fox Rive

1920

Light-Weight City Cars

Showed the way to

"—And both the company and the public are pleased with the cars and with the service they are giving."

A familiar testimony of satisfaction realized from G-E Car Equipment consistently selected for modern light-weight cars.

In this case, the city cars are equipped with GE-264 Motors and K-Control; the new interurban cars with GE-265 Motors and K-Control.

Light-Weight Interurbans

1924

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GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., SALES OFFICES IN ALL LARGE CITIES

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